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The Spectrum of Electromagnetic or Radiant Energy and the Types of Radiation Used in Medicine[1]

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At the present time almost all hospitals of Class A standing have a physical-therapy department, that is, a department where certain treatments are given for the relief or cure of disease by means of physical agents.

In this broad sense, the term physical-therapy includes all methods of treating disease except by drugs and surgery and purely psychic measures. Under this head, then, would come hydrotherapy, mechanotherapy, massage, the various branches of electrotherapy, and radiotherapy with its subdivisions—phototherapy, infra-red and ultra-violet therapy, X-ray and radium therapy.

Hydrotherapy, mechanotherapy, and massage will not be further discussed in this paper. This, however, does not mean a disregard for their value. It will be noted that most of the other physical agents mentioned require for their generation or application, machines or various pieces of apparatus more or less intricate of design and imposing in appearance. And so, as we stroll through the rooms of the physical-therapy department of a well-equipped hospital we are shown the X-ray machines valued at $5,000 or more, various machines for the development of currents of high frequency for light and heat bathing cabinets, generators for infra-red rays, and for both near and far ultra-violet rays. And at last under lock and lead we may be shown several inconspicuous capsules and needles containing radium of sufficient value to much more than cover the cost of all the machines and devices found in the other rooms.

The Speed of Light

Now there is one rather striking fact about the output of most of these machines or generators: whatever the output is, it travels from the generator to the patient at one and the same rate for them all, namely, the rate of which light travels, 186,000 miles per second. This means that if we had instantaneous communication with the sun and should order a freshly prepared dose of ultra-violet, it would reach us in about eight minutes, beating by several laps the time it takes to get a seidlitz powder from the corner drug store. If a patient is receiving X-ray treatment the rays which penetrate his body are traveling at the rate of 186,000 miles per second. If ultra-violet is being administered the rays from the generator are very different in effect but they travel at exactly the same rate, namely, 186,000 miles per second. If phototherapy is administered, the output of the lamp travels at the same rate. And even when the treatment calls for the invisible, soothing, and apparently lethargic infra-red, it also travels at the rate of 186,000 miles per second.

This uniformity of rate of propagation certainly suggests a kinship among these various types of energy. In fact, each of these "modalities," for those who do not object to the word, is a part of one great whole, namely, the spectrum of radiant or electromagnetic energy.

Light or that part of the spectrum of electromagnetic energy which has a specific effect on the organ of vision is to us most familiar. But while light is so common, so abundant, and so essential to both animal and vegetable life, it is still a very small part of the family to which it belongs. When Sir Isaac Newton, some 250 years ago, placed his glass prism near a hole which he had cut in a window shade, he saw the beam of light refracted and end on his screen in a beautiful display of colors—the rainbow colors. But Newton saw and recognized only the visible radiation. He never knew or even suspected that there is an extensive series of radiations, heat rays below the visible red and ultra-violet beyond the visible violet which cannot be detected by the eye alone. If his prism could have produced a normal spectrum of all the rays in the beam of solar energy and his eyes could have seen it in its entirety from the extreme ultra-violet end to the furtherest infra-red, he would have seen a spectrum along the entire length of the room.

And still the whole solar spectrum constitutes a very tiny fraction of the whole spectrum of radiant energy. The visible solar spectrum covers a little less than one octave. This means that the number of oscillations per second in a ray of violet light is not quite double the number of oscillations per second in a red ray. And there are millions of octaves in the whole spectrum of electromagnetic energy. It is now known that the whole spectrum contains a vast number of different wave lengths and frequencies with varying prop-

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erties and effects and yet alike in rate of propagation, governing laws, and physical characteristics.

Unity in Great Variety

These rays, though having physical characteristics and governing laws in common, occur in the greatest conceivable number of variations in wave length and corresponding rate of oscillation. To measure the shorter of them the Angstrom unit, 1/10,000,000 of a milimeter, is used. Ten million of these little foot rules laid end to end would stick entirely through a sheet of ordinary blotting paper. And yet, this tiny measure is one thousand times too long to express the length of the wave of the shortest known ray, the cosmic ray of Millikan. The wave length of this ray is about 1/1,000 Angstrom unit. Running now *down* the scale of number of oscillations and increasing wave length we come occasionally to rays with which we are more or less familiar. The first of these is the gamma rays from radium. Their length varies from 1/10 to 1/100 Angstrom unit. Not very far from the Greek-letter rays, we find an English-letter, the X-ray. It varies in length from several tenths to several hundredths Angstrom units. This is now a very common ray, about which everyone knows something good or something bad. Quite a distance down the scale we find a ray which has gotten out of fractions. Its wave length is measured in whole numbers. Ultra-violet waves vary in length from about 1,000 to 4,000 Angstrom units. These rays you see cover about two octaves of the spectrum. Few people know this, of course, still most people these days know a lot about ultra-violet if you care to listen.

One step downward and we reach the visible spectrum, the realm of light. Not one step, for there are no steps in the spectrum. One ray length blends gradually into another and really overlaps the other. There is no space where violet ends and indigo begins but one gradually blends into the other. The spectrum of radiant energy seems to be a continuous quantity like time, which is not by nature split up into man-made units of years, hours, and seconds. On down with decreasing oscillations and increasing wave length through violet, indigo, blue, green, yellow, and orange we find the longest of all the visible rays, the red, with a wave length of 7,500 Angstrom units. This is the end of the *visible* spectrum, but by no means the real end. Infra-red rays or heat rays begin where red fades from view and increase in length till they reach 30,000 or more Angstrom units. We are all familiar with this part of the spectrum although we did not know it until a few years ago.

The next group of rays about which everyone knows something have become so long that another unit of measure is found more convenient. A unit ten thousand million times as long as the Angstrom unit. This is the meter—a little more than a yard. We reach now the region of the Hertzian waves, or in plain English radio waves. Radio waves vary greatly in length, from a few meters up to 12,000 meters, or about seven miles.

This gives us some idea of the extent of the spectrum of electromagnetic energy. It has been said that if the visible spectrum, less than one octave, were to be drawn to the scale of one foot, then all of the octaves of the whole spectrum would stretch away for more than a million miles.

Rays Unknown Until Recently

It will be noted that these different groups of rays with which we are more or less familiar occur at widely separated parts of the spectrum. There are skips of

A GROUP ATTENDING THE CONVENTION OF THE ILLINOIS
ROCK ISLAND, ILL.,

many, many octaves at times. These areas of darkness, however, are more apparent than real. Physicists are gradually bridging the gaps and learning the properties of rays still unknown to the average individual. As this process goes on, it is not unlikely that rays will be discovered with properties as startling and useful as those of the X-ray, which were undreamed of only 33 years ago.

To help complete our concept of the potency of the spectrum we might call to mind the work done by a very small part of it, the solar spectrum. It is easily conceived that practically all motion, change, growth, and display of energy that we see around us come to us primarily from the sun by way of the solar spectrum, on the wings of unthinkably rapid vibrations. The pitiless fury of the storm and the calm beauty of a field of ripening grain; the roar of Niagara and the gentle dew at evening have alike their origin in the solar spectrum. All life both animal and vegetable is dependent upon this radiant energy coming to us over 93,000,000 miles of space by vibrations of the man-made ether.

The known facts about electromagnetic waves are: that they are of tremendous importance in cosmic affairs; that man by nature is not aware of their existence; that they all travel at the same rate, namely 186,000 miles per second; that they all present or exhibit definite *measurable* periodicity or frequency which divided into the velocity of light gives their wave length; that they all decrease in intensity with the square of the distance from their source; and that they are possessed of varying properties or effects which seem to be determined by wave length only. We know too that we can produce and study and make use of these waves of an infinite variety of frequencies ranging from the very long radio waves, seven or eight miles in length, up through heat waves, to light waves, up still through ultra-violet rays to X-rays and gamma rays with frequencies of from 10,000 to 50,000 that of ordinary light.

The Ether Theory

But there is much still unknown about radiant energy. The ether, the very medium over which it is supposed to travel is one of the most unsatisfying concepts that the mind of man has ever felt it necessary to invent. Like the earth as described in the first chapter of Genesis it is "without form and void, and darkness is upon the face of the deep." The ether has no weight, no form, no material existence, no size, no shape, no limit. Its one accomplishment is to vibrate. And how can a concept with no material existence vibrate? Small wonder, then, that some physicists deny its existence, and can as easily conceive of a ray of light traveling a few million miles over nothing, as over this same nothingness by a different name. Still the ether, like the liver, helps to explain a lot of things.

But if the ether were satisfactory, still we could at the present time, in the words of Professor Millikan, make no mechanical picture whatever of the act by which an ether wave is born and started on its journey through space. Both the mode of birth of an ether wave by an atom and its mode of transmission from star to star are still almost complete mysteries.

The above constitutes a brief review of the whole subject of radiant energy, and I believe that it is well for those of us who prescribe and for those of us who administer treatments that have to do with radiation to bear some such review in mind so that we may the

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better realize the nature, and scope, and possibilities of the thing with which we are dealing.

But to have a practical working knowledge as well as a fair mental grasp of the different branches of ray therapy it will be necessary to inquire into the varying properties of the different wave lengths which have been found to be of service in either relieving or curing human ills. The essential thing about any therapeutic agent is that it at least have some effect upon the living organism, that its application result in some tissue response. We do not soothe an itching skin by the tones of a violin, or blanch out St. Anthony's fire by the beating of drums, because the skin offers no response to sound waves.

Physiological Effects of Rays

Consider the properties, and some of the reactions produced by radiant energy of different wave lengths. The Hertzian or long radio waves pass readily through all material objects including living beings. The human organism has no sense organs to detect the presence of these waves and so far as is yet positively known no effect for good or bad is produced in animal tissue. In spite of the fact that *genus homo* is literally soaked in these waves from night to night there does not seem to have been any change in the general health since the advent of the radio age.

It may be mentioned, however, in passing that recently a heating effect has been noted from the output of the largest broadcasting tubes. Men working near these tubes have "fallen out" with the symptoms of heat prostration. It has been suggested that this effect be utilized in the artificial production of temperatures sufficiently high to kill certain invading microorganisms.

Infra-red rays are rather slightly tissue penetrating but their characteristic effect is rapidly spread to the whole organism by the blood stream and by conduction. These rays pass readily through glass and other transparent media—ice for example. Most living organisms have sense organs for the detection of heat rays.

Living tissue gives ample response to heat rays. Blood supply is increased. All the chemical processes of the body are accelerated, resulting in increased metabolism. Microorganisms that can withstand only limited degrees of heat are killed. If local temperature is too greatly increased, local tissue death results, and if the general temperature rises beyond a certain point or falls below, death of the organism results. With these facts before us there is certainly a high probability of therapeutic effect from the use of heat rays.

And this brings us to the subject of the therapeutic application of electric currents of high frequency. Most men who have had a large experience in the use of high-frequency currents rather strongly believe that all of the good effects from the use of these currents can be traced to the heat produced by them. This is certainly apparently true when we consider what is taking place during electrocoagulation. Here we are apparently dealing with heat and heat only. But in minor surgical work by the single pole method, fulguration, or dessication some things are to be considered which lead us to doubt that we are dealing with heat only. A shower of tiny hot sparks are caused to go through a mole or wart. The lesion shrinks and shrivels, drys and finally is left as a flat charred crust. This process is somewhat painful—quite so to some individuals. But almost the moment the process is completed and the spark withdrawn all pain subsides. Nor is there any pain to speak of during the healing process. If such a lesion were burned to a crust by the actual cautery, it would be quite painful for many hours, and there would be considerable pain during the healing process. Again, ordinary burns are quite prone to develop hypertrophied scars and keloids. In more than 50,000 fulgurations for the destruction of skin malignancy, moles, warts and other blemishes I have not seen a single keloid develop. I have also removed a few keloids by this method and have not seen them recur. Has high frequency some specific effect on nerve terminals causing the rapid subsidance of pain? Or has it some effect on the trophic nerves to cause rapid healing and freedom from unsightly or painful scars?

In the face of these observations one is rather strongly tempted to believe—but to know is a different matter—that, in high-frequency currents, we are dealing not with heat only but with heat plus.

This belief is somewhat strengthened by some of the results seen in the medical application of high frequency. The great relief from pain, the improved circulation, the relief of nervous symptoms, the soothing and strengthening effect seen in many cases of pneumonia under diathermic treatment are a little more than one would think would be caused by heat alone.

A case of acture lumbago or torticollis precipitated by exposure to cold, with almost rigid muscles and great pain, which has found only slight relief from hot applications and counter-irritants, will experience almost instant relief from high frequency from a glass electrode over the bare skin of the involved area. This relief will be experienced, and the patient will volunteer information to this effect, long before the deeper structures have had time to receive any appreciable heating—if indeed any occurs from this surface unipolar application. But relief does occur and in practically every case. In about ten minutes the skin has reached tolerance temperature, the muscles have relaxed and all ordinary movements can be gone through without pain. The patient has received a symptomatic cure in only a few minutes.

If the advocates of the heat-alone explanations are right, and possibly they are, we must regard high-frequency treatments as heat treatments only, the special virtue of the current being its ability to generate the heat at any required point and to any required degree.

The function of the high-frequency current, then, is about the same as that of the commercial current in supplying electric light to a building. On account of the safety, and flexibility of the electric supply, any part of the building may be flooded with light by the mere push of a button. But the light supplied in this way is not, strictly speaking, electric light. It is light given off by a tungsten filament ceiled within a vacuum bulb and rendered incandescent. If there were another cheaper or safer method of rendering these filaments incandscent, it would in all probability be used, and our electric lights would bear a different name. By the same reasoning, a high-frequency treatment is not an electrical treatment, but is a heat-ray treatment, and the only function of the current is to generate the heat at the desired point.

But whatever may be the reasoning of those who hold that all results obtained from ordinary or damped high-frequency current are due to heat generated by their passage through or into the patient, this reasoning does certainly not apply to the undamped or so-called cutting current.

This current is obtained from a radio transmitting tube. Its oscillations are extremely rapid—far more so than in the ordinary high-frequency circuit. These oscillations are of a continuous nature and lack the damping effect of the condenser.

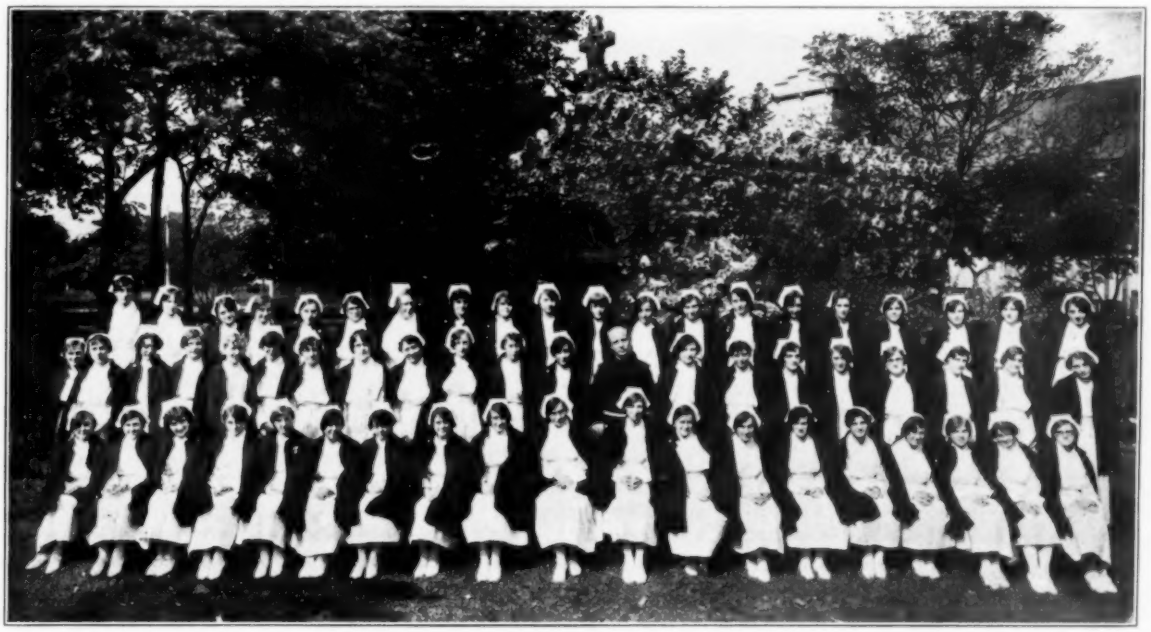
Tissue cutting by this current is accomplished by gently drawing a pointed electrode across the tissue to be divided. The tissue divides rather than is divided. The electrode is not of cutting edge, nor is any pressure used. No heat is developed. Both the electrode and the tissue remain cool. Certainly the current in this case is doing something other than developing heat within the tissue. Strong tissues—skin, muscle, fascia, tendons, fall apart under the gentle touch of this needle-like electrode as if they indeed were responding to a master's command.

Chemical Explanation of Electric Cutting

What is happening? Likely this: All chemical compounds are entered into by atoms or radicals, a part of which are electropositive and a part of which are electronegative. This means that some of the atoms have an excess of electrons and some a deficiency of electrons. Such atoms stand ready to combine with each other. In the words of the older chemistry such atoms have chemical affinity for each other. When these atoms combine they form molecules which are neutral electrically speaking. Such are the molecules making up the tissue which we are about to see undergo electrical separation.

When an electrode carrying a stream of rapidly oscillating electrons, which is an undamped high-frequency current, is brought in close proximity to masses of these neutral molecules, such numbers of electrons are brought in contact with the atoms that their electrical balance is destroyed, their chemical affinities changed. They can no longer remain in combination. The result is in effect an explosion of the molecules and a line of cleavage under the point of the moving electrode.

Next to the infra-red or heat rays we find the longest rays of the visible part of the solar spectrum. These are the red rays. They have a wave length of about 7,500 Angstrom units. Shorter and shorter become the rays of the several rainbow colors until we reach the violet with a wave length of about 4,000 Angstrom units. This is the limit of visibility, or it



SODALITY, ST. ALEXIS HOSPITAL, CLEVELAND, OHIO
Grotto of the Immaculate Conception in the Background

is at least the limit for man. Rays shorter than 4,000 Angstrom units make no appeal to our organ of vision. This small portion of the whole spectrum, less than one octave, this part that we will call the visible spectrum covers every shade, every color, every tint, every kind of light that has ever been seen or used or generated or ever will be generated. This is, of course, the part of the spectrum with which we are most familiar, the part whose properties are best known, and the part that has been the subject of more investigation and study than any other.

Light Therapy

Which, if any, of these properties suggests the use of ordinary light as a therapeutic measure? In other words what, if anything, is the basis of phototherapy? Of course, in a general way it is known that light is essential to the well-being of most plant and animal life, but is this a reason for phototherapy? The very fact that it is essential may be nature's reason for supplying it in such unlimited quantities. Enough is as good as a feast—in fact better. Most people living and moving in white light during the day receive the full quota of their health requirement. Why try to add to nature's ample supply an artificial product? If everyone's food supply contained enough iodine, it would be foolish to administer iodine for the cure and prevention of goiter. And so, to me at least, light baths are simply heat baths—of an expensive variety. And the many lamps giving off only heat and the visible spectrum are a snare and a delusion.

Various colored lights have certain psychic values but they hardly remove demonstrable pathology.

Just beyond the visible spectrum we find the ultra-violet rays. These rays vary in length from 4,000 Angstrom units down to 1,800 and likely to 1,000. They constitute about two octaves of the whole spectrum. This is somewhat more than double the length of the visible spectrum.

The properties of these rays vary considerably with their length, still they have certain properties in common. They are all quite chemically active. That is, they bring about chemical changes in many substances. They are powerful bleaching agents. They are ionizing agents, rendering gases conductors of electricity. They act powerfully on photographic films, which, of course, is only an illustration of their chemical activities. They cause many substances to flouresce or give off visible rays. They are unable to pass through many substances which transmit ordinary light—glass being an example. They are able to pass through some substances which are transparent to white light—fused quartz being the best example. They pass through distilled water with far greater ease than do the most penetrating X-rays.

The shorter of these rays—in the 2,000 Angstrom unit region—are among the most powerful bacteriocidal agents known.

For this reason short ultra-violet rays are used frequently to sterilize the water of public swimming pools. They are absorbed by air to a very considerable extent—the short lengths more readily than the longer. Air that is heavily laden with smoke and watery vapor filters out a great part of the ultra-violet from sunlight.

These rays appear to be about as essential to the growth and health of the higher animals as are the rays of the visible spectrum to higher vegetable life. It is chiefly their effect upon man with which we are here concerned. When these rays fall upon the human skin in excessive amounts they produce a marked inflammatory erythema blistering, desquamation, and tanning. It is these rays in the solar spectrum that produce the "healthy coat of tan"—likely not a misnomer, for these simple visible effects are some index to changes that have taken place in the blood. In fact, blood chemistry seems to be as profoundly influenced by these rays as is the chemistry of the chlorophyll system of growing plants by the rays of the visible spectrum. A deficiency of ultra-violet causes a deficiency of calcium, iron, and phosphorus in the blood. Add a certain amount of exposure of the bare skin to ultra-violet and those elements will be taken up from food and fixed in the blood stream. At once a number of diseases come to mind which should be benefited by this agent.

But since ultra-violet is abundant in the solar spectrum and since most individuals get some sunshine, why is it necessary to administer the artificial product? For quite obvious reasons: People are living most of the time indoors where they do not receive the ultra-violet rays of the sun; and they must wear clothing which prevents these rays from reaching the skin. Again, the air is supposed to be reasonably pure and free from the dust and smoke and steam found in and over large cities which filters out most of the health-promoting ultra-violet. There are, too, some countries where the number of bright sunny days is quite limited. Under all of these conditions ultra-violet artificially generated and administered is capable of doing great good work. It will cure a number of diseases that no other remedy will cure, and by increasing resistance it will help in the cure of a great number of others. In the judgment of the writer it should be placed second in importance of all agents used in physical-therapy.

From ultra-violet to X-rays is a long jump over many octaves of the spectrum. And yet these wave lengths constitute the next group of rays with which the average man is somewhat familiar. These rays were entirely unknown prior to 1895. So remarkable, however, are some of their properties that within a few days of Roentgen's announcement some knowledge of them had been flashed to every corner of the globe.

X-Rays a Sensational Discovery

Unquestionably the most astonishing property is their ability to pass easily through solids which had always been regarded as opaque. Bricks and mortar offered not too much resistance, partition walls very little resistance, and the heaviest clothing practically

none. These were new ideas and were unquestionably of front-page value.

But, if X-rays are penetrating, they proved to be more than that, even explosive, in their effect on the armor of smugness which seems to have incased many physicists toward the end of the nineteenth century.

The nineteenth century was an era of great scientific achievement. In all branches of science much had been done. In chemistry all of the elements had been discovered. All of the laws governing chemical reaction were known and numbered, and chemical affinity was a perfect explanation. In physics the law of the conservation of energy was held in supreme respect—energy was energy and matter was matter. The immutibility of the atom still held sway. All laws of nature had been discovered, and in the words of our German friends everything worked out "according to plan." Scientists were somewhat inclined to be filled with pride in their accomplishments and in the mood of Alexander were sighing that there were no more worlds to conquer.

At about this time, the closing years of the nineteenth century, came the X-ray and three years later radium. With the advent of these two came trouble for the older order of things. Radium would not assume the temperature of the surrounding medium, but persisted in being a few degrees warmer than its surroundings. The radium atom would not behave like an atom. The atom was the ultimate end of division, could not be cut. But the radium atom was continually sending off showers of tiny particles as atoms had never done before—that is, orthodox atoms. Radium was continually giving off energy without any known supply, "reaping where it had not sown."

X-rays refused to be refracted or reflected by any means then known; they refused spectrum analysis and refused to be entirely stopped or quenched by any known substance. This was very bad behaviour for rays whose laws were all laid down in the books. Were they really rays or were they quanta? Were they vibrations or were they showers of material particles?

These two that arrived in the world of science almost as twins, were modern free lances refusing to obey old laws or to be explained by time-honored theories. They were heralds of a new day, the advance guards of the new knowledge, of the science of the twentieth century. They were nature's answer to self-satisfied science of the nineteenth century sighing for new worlds to conquer.

It has now been determined that X-rays are actually rays, and that the output of radium is partly streams of material particles and partly rays of the same order of lengths as X-ray and of quite similar properties. These rays, then, are a part of the spectrum of electromagnetic energy. Incidentally they are the shortest rays in the spectrum of which we have any very definite knowledge.

The properties of X-rays and the gamma rays of radium are so nearly similar that we may consider them jointly. These rays are possessed of many properties which make them of very great service in the field of medicine. They are possessed of very considerable chemical activity. They penetrate all substances in proportion to their density. These two facts make possible the making of an X-ray film, which is a chemical record of differences in density encountered by the ray in its passage through the body tissues.

X-rays excite fluorescence in many substances. This is utilized in making rapid films and also in fluorescopic examinations in which we "look through" patients and study the movements of the various structures. These two measures are of the greatest possible value in the diagnosis of disease.

Certain other properties point to the possible usefulness of these rays in the treatment of disease. Their ability to bring about chemical action extends to a living tissue, that is they have biochemical action and are capable of most profoundly influencing metabolism. It has been found that certain tissues and organs of the body are far more sensitive to radiation of this type than others. Certain cells of the reproductive organs are extremely sensitive. Glandular tissue in general is fairly sensitive. Glandular tissues—Lymphoid tissue, especially when diseased (lymphosarcoma to illustrate), is very easily influenced. The blood, and again especially when abnormal, as in the leukemias, comes very easily under the influence of this radiation. In general, malignant tissue is more susceptible than normal tissue. For example, almost all skin cancers may be cured with less radiation than will materially damage the surrounding skin. Malignancies differ a great deal among themselves as to radio sensitiveness. This seems to be governed to some extent by the organs from which they arise. A high percentage of cancers of the cervix may be cured by radium and X-rays combined; but in the face of cancer of the stomach we are still helpless.

Brain and nerve tissue are the most resistant of all the body tissues, with the possible exception of bone, and this likely accounts for the fact that brain tumors respond indifferently well to radiation.

Destroying Microorganisms

Microorganisms are not killed by raying in pure culture, but not a few of them may be killed by raying the tissue which they are invading. Blastomycosis of the skin is an excellent example. The organisms cannot be killed by raying in pure culture, and yet one full X-ray treatment to the lesion and some surrounding skin causes the death of the organisms and rapid healing of the lesion. The explanation likely is that radiation stimulates the formation of antibodies and these in turn bring about the death of the pathogenic organism. Numerous instances of this action could be cited.

Considering, then, all of these variations in influence—the greater susceptibility of diseased tissue, and the influence on pathogenic microorganisms, the value

of this type of radiation as a therapeutic measure is certainly very strongly suggested.

And so it is that X-ray and radium constitute a therapeutic measure, the value of which is not likely to be overestimated. Since the coming of these agents several diseases have been removed from the incurable list, many have been removed from the list of those for which nothing offered any sure relief, and in the list of those diseases in which radiation is the method of choice there are already well over a hundred different diseases and conditions. Likely, X-ray and radium constitute the most important physical method today in use for the cure and relief of disease.

Summary

There has been presented a sort of bird's-eye view of the whole spectrum of radiant energy with its vast numbers of different wave lengths. What is generally known of the properties and uses of the rays constituting certain sections of the spectrum has been reviewed.

It has been noted that the properties and effects of certain wave groups very strongly suggest their use as therapeutic agents, and that this, coupled with observed clinical results, constitutes a reasonable basis for their use in medicine.

The prediction is ventured that the first quarter of this century will be looked upon as an era of great advances in scientific knowledge brought about largely by research in the field of radiation, and that in medicine it will be regarded as an era of physical therapy most of which has to do with certain portions of the spectrum of electromagnetic energy.

CHAPEL AT ST. FRANCIS HOSPITAL, JERSEY CITY, N. J.

ST. FRANCIS HOSPITAL, JERSEY CITY, N. J.

Electrocoagulation and Ultra-Violet Light as Adjuncts to Surgery[1]

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SURGEONS have always made use of two of the physical energies, heat and water. The actual cautery in the form of the hot iron, was used in former years much more extensively than cauteries are today. This is easily accounted for, by the fact that forceps for the control of bleeding were until recent years unheard of.

Water was used only for its detergent effects, bacterial destruction, of course, not being thought of. Later, as bacteriology was better understood, and the germ theory advanced as the cause of inflammation, germicidal agents were added to the cleansing solution and the birth of Lister's Carbolic spray in the operating room was announced. As time passed many agents were used that were known to have, and thought to have a germicidal action, being dissolved in water in various strengths. This was the era of antiseptic surgery. Today we have long since passed this era and practice aseptic methods exclusively.

Later, the use of the sun's rays was found to have some beneficial effects on certain conditions. Many years ago, I recall, the attention of the surgeons was attracted to the use of the sun's rays for infections of the limbs. Particularly was its use thought to be beneficial in thrombophlebitis, and we were advised to place the patient in the shadow, but allow the limb that was affected to protrude in the bright summer's sunshine where the heat would come in contact with the limb for at least one hour each day. Nothing, of course, was known or thought of, in connection with the several bands of the spectrum, and the treatment so advocated was purely empirical.

Various Cautery Devices

Returning to the use of the hot iron in surgery, we find it had many disadvantages. It was heavy, cumbersome, hot when and where not needed, and incapable of retaining sufficient heat to be of service in the most trying cases, where its use would have been most desirable. Efforts to overcome these objections brought to our attention the Paquelin cautery. This was smaller, supposed to have a continuous heat from the benzine vapor, and replace the time-honored hot iron. Its disadvantages were many. Being small, the loss of heat was almost instantaneous; and it had a tendency to refuse to work when most needed, therefore failing in its purpose.

The next step in the application of local and concentrated heat was the use of the electric cautery. This seemed to have all the advantages of former methods, and possessed the virtue of having the energy always in action on its elements, and thereby maintaining its destructive properties. Here again we were disappointed in not being able to keep the instrument hot enough to accomplish results while in actual use. In light work it served its purpose but in the so-called heavy work, the tissues and particularly the blood rendered it ineffective. Today its use is limited to the severing of the hollow viscera, and possibly to a few of the minor surgical operations in the hands of those not familiar with the more thorough and modern methods of the destruction of tissues by the high-frequency current.

ELECTROCOAGULATION

Electrocoagulation is the coagulation or cooking of tissues by surgical diathermy and is produced by a biterminal high-frequency current of the d'Arsonval type, utilizing a multiple spark gap.

There are many different methods of technic in the application of this form of tissue destruction made necessary by the particular case to be treated. Time will not allow a description of these but practical experience must be had to carry them out successfully. It may be stated, however, that the active electrode should be pointed. There may be a few exceptions to this rule, where a small spherical tip serves best. Such an example is found in throat work where a needle point might be less satisfactory. Disc electrodes are seldom used and really are not to be suggested. They heat too slowly; they do not act on deep tissue, or if they do, we are not certain how deep.

Making Electrodes

Since the current is entirely thermal, not electrolytic, it matters very little what metal is used to fashion the electrode we desire. Sewing needles of various lengths and sizes may be used. Where larger ones are needed, the old darning needle of our mothers serves a valuable purpose, or the knitting needle (now extinct except in rare instances) covered with spaghetti tubing, such as is used in radio work, will give the length necessary. Where these are not to be had any piece of wire that is stiff enough to resist the slight pressure used in introducing it into the tissues will, when insulated with a small rubber tube, answer all demands made of it.

The writer has for years used aluminum needles which are very satisfactory, can be had at a nominal cost, and have the merit of being nonbreakable.

Whatever pointed electrode is selected is attached to the handle on an insulated cord, leading to one post of the d'Arsonval terminal, and to the other is attached the same kind of cord leading from the other terminal to the dispersing electrode which may be of any metal, such as block tin, that has been fashioned so that no sharp corners will be present to permit of arcing, or an asbestos pad may be used for the same purpose. The metal should not be moistened, but applied direct to the

[1]Read at the 13th annual convention and 2nd annual clinical congress of the Catholic Hospital Association, held at Cincinnati, Ohio, June 18-22, 1928.

skin at all points, and kept in close contact to obviate sparking.

The asbestos pad should be moistened, and should likewise be held in contact with the area covered to prevent the current jumping across, or arcing. These may be placed on any part of the body most easily accessible. In uterine work the sacral region is preferred, for the anatomical reason that all the lymphatics pass posterior to the peritoneal cavity, and the action of the current through these is very much desired when treating malignancy.

Electrocoagulation Requires Skill

Electrocoagulation is a surgical operation and should not be attempted by anyone not doing surgery, and thoroughly familiar with the anatomy of the parts to be treated. He should also be familiar with the current strength needed to do the work in hand, and should not under any circumstances use this method until he has practiced many times on a piece of beef.

While this is dead tissue it will give us a good working rule as to how much current is needed and what length of time is necessary to destroy a given tissue to a given depth.

No attempt should be made to do this work without having a foot switch attached to the machine to control the current. Assistants can not do this for you, as the current must be broken each time when the electrode is removed and inserted in a new place. If the current is not broken, burning will take place in tissues not diseased and desired saved. Any machine giving a flexible current will serve your purpose. By a flexible current is meant one that can be reduced in intensity to the smallest visible spark, such as would be needed in working about the eye, yet capable of being stepped up to a volume sufficient to destroy the structures of the uterus, or a tumor.

This means a current of such low reading that the milliammeter does not register, to one that registers as much as four thousand milliamperes when a reasonably large electrode is in the structures. The amount of current at any given setting of your machine may be ascertained by bringing the pointed or operating electrode within one-eighth to one-quarter inch of the other terminal of the machine to which the dispersing electrode is attached, when a current reading will show on the meter of from three hundred and fifty to five hundred less than when working in the tissues.

Never try out your machine when the patient is in the room, as the sparking with usually frighten him. Again, do not use too high a current reading. Use less current for a longer time, this allows the tissues to heat well out from the electrode. Keep in mind the fact that you are not using a cautery, which must be depended upon to give up its heat to the tissues, but that you are generating the heat in the tissues themselves, by the action of the current; in other words, the resistance of the tissues to its passage through them generates the heat, just as the resistance of the coils of wire in the toaster get hot by the resistance to the flow of current through them.

Advantages of High-Frequency Current

The advantages of the high-frequency current over the cautery are many, and when once they are understood and used by the surgeon, cauteries will become almost obsolete. The advantages are: It is a bloodless operation; there is no shock and no pain after the patient returns to his room, due to the obtunding of the nerve endings by the action of the current. Sterilization is thorough; there is no metastasis in malignant conditions due to the work; conditions otherwise inoperable may be removed with safety; the operation is easily and quickly done; there is rapid convalescence; your operating electrode is always cold, yet ready to destroy tissue to any depth desired, depending on the current strength used and the length of time employed.

The disadvantages of electrocoagulation are destruction of important blood vessels and nerves, secondary hemorrhage from blood vessels that have become overheated, and the destruction of the periosteum when working near bone.

Electrocoagulation far surpasses the cautery and surgery as well, in the removal of cancer from any part of the body, save the hollow viscera, and organs in the upper abdominal cavity. In cancer of the neck of the uterus, nothing can compare with this method in the results obtained, and the rate of mortality, which should be nil following this type of work. Cancer on the surface of the body, is best treated in this manner. If there is a chance for relief you have given it to the patient, when you have raised the temperature of the cells in the involved field to many degrees above the normal, as heat is the only agent known to always destroy cancer cells.

Removing Carbuncles

Again in carbuncles, you have the method *par excellence,* as you have no bleeding during the work, no shock, no pain, immediate control of sepsis, and unless the patient is already moribund, you will have relief in all cases with the least amount of scar following. In basal cell carcinomas of the face and scalp, you have no trouble in a complete cure if a cure is to be had.

These growths do not spread by way of the lymphatics as does carcinoma elsewhere, but by continuity and contiguity of structures, and a thorough coagulation of all diseased tissue will effect a cure. The first operation is the best chance for relief in any cancer and calls loudly for a thorough destruction of the growth even though it may mean a destruction of an eye.

Again in tubercular infections of the vulva, nothing is so effective as coagulation, but here again thorough destruction must be done.

Another troublesome surgical condition that is frequently met with is abscess of Bartholin's glands. Any surgeon who enucleated one or more of these recalls readily the bleeding that is encountered, and the time consumed in the operative work. Opening of these abscesses, and either at the same sitting, or one or two

days later, lightly coagulate, or even dessicate the entire sac and no further work is needed. There is no bleeding and the time consumed in completely removing the remnants of the gland is very short, requiring only a few minutes.

ULTRA-VIOLET LIGHT

Another adjunct to the surgeon's armamentarium is the ultra-violet lamps. The great work of Rollier in the use of the sun's rays for the relief of surgical tuberculosis, has attracted the attention of the foremost thinkers. So also has the work of Steenbock, Hess, Bovie, and others attracted equal attention in the medical world. It logically follows that physicians would look to this agent as being one that could be depended upon to accomplish wonderful good. It is but natural that too much would be expected, and its use in many conditions in which it was not indicated, but even contraindicated would be the result.

It is to be hoped that more study will be made of the contraindications. It is generally conceded at this time that it should not be used in those having active hyperthyroidism, noncompensating heart lesions, acute active tuberculosis, acute nephristis, pellagra, those having had sunstroke, highly nervous patients, and diabetics. One treatment in a diabetic may be sufficient to produce a comatose state.

Clinically speaking we have two kinds of ultra-violet, the air-cooled and the water-cooled lamps. The air-cooled lamp has the long wave length, due to the mantle of mercury vapor that surrounds the uva arc inside, which prevents the short wave lengths from coming through. This being true, it is eminently metabolic. The water-cooled condenses the mantle of mercury vapor, thereby allowing the short wave lengths to come through, and for that reason is known as the bactericidal lamp.

Benefits Many Cases

Both have their distinct features in the hands of the surgeon. The air-cooled is his constant helpmate in the treatment of tubercular peritonitis, where it is almost a specific. Again in those cases needing a general body uplift, such as the anaemic case, the chlorotic girl, the delayed fracture case where the distribution of the calcium and the phosphorus is not being carried on normally by the system, and again in the cases of rickets, where the ultra-violet is a specific and no one challenges its merits.

Those doing obstetric practice find in the air-cooled ultra-violet a most helpful agent in treating the mothers during the period of gestation, preventing the rapid decay of teeth so often seen. Especially is its application efficacious to the foetus by maintaining the calcium and phosphorus balance in the system of the mother.

Another field of usefulness is in the management of those under-nourished cases coming to the surgeon for operation, or at least advice. Many such persons live remote from those possessing lamps, but the help is easily carried to them by raying either olive or cod-liver oil for 20 minutes at eighteen-inch distance. This rayed oil holds its vitamin content for about four months and supplies the way to revive these unfortunates. So many cases are benefited by its use that it is hard to conceive how any modern up-to-date hospital or physician can be without it.

The water-cooled ultra-violet is strictly a surgeon's lamp, since it is dominantly bactericidal. One of the first lessons learned by Koch in his study of the tubercular baccilli was that a short exposure to the sun's rays destroyed its activity. The late Dr. Gorgas believed that any stream of water that ran for as much as fifteen miles, fully exposed to the sun's rays was fairly safe for drinking purposes. During the world war, the typhoid vaccine used in immunizing the soldiers was all sterilized by passing it fifteen times around an ultra-violet uva arc.

These examples should be sufficient to convince the most skeptical that the virtue of ultra-violet rays is not over estimated, but that they do possess the power to kill infection when brought in direct contact.

This means that all surfaces to be treated must first of all be cleansed of pus, serum, etc. All discharges must be removed before applying the lamp. When this is carried out and the lamp is working efficiently, results will be positive.

Using Photosensitive Agents

Again we can enhance the action of the rays by using some form of photosensitive agent that will carry the rays into recesses that could not otherwise be reached. Such agents are 10 per cent aquaeous solutions of resorcin painted on the surface to be treated, or peroxide of hydrogen. These do not stain, and they leave no trace after the wound is healed. Both have also some action on the bacteria present.

In cavities we may use the same strength of aquaeous solutions, or glycerine solutions, of any of the aniline dyes, such as carbol-fuchsin, gentian violet, brilliant green, etc. Word should be sounded against the use of mercurochrome. While it is a good photosensitive agent, its use is dangerous, due to the action of the mercury in those who have an idiosyncrasy for it, and in such cases a rapid poisoning may be produced.

In facial erysipelas, how often have we wished for a control. A sufficient number of cases have been treated for me to assure you that you have in the water-cooled lamp such a remedy.

Use the lamp at six-inch distance, open window for three minutes in each area and repeat twice daily if possible. Three or four treatments will usually be sufficient. If the case is stubborn, continue to treat but do not use salves, as the rays will not penetrate these, and they are very difficult to remove. Aquaeous or glycerine solutions may be used if so desired.

Again in those cases having a multiplicity of furuncles in the external auditory canal. Thoroughly cleanse the ear, and use the lamp at six-inch distance for two minutes each day, directing the rays into the canal. You may also use the pencil applicator, prefer-

ably the prismatized, so that all portions of the infected area may be exposed. These cases should, of course, be examined for sugar in the urine, and if this is found, they should have diet and such treatment as may be indicated.

So also can you do much to relieve the sinus such as is found leading down into the abdominal cavity to a tubercular process that was found at celiotomy. These sinuses are very stubborn to heal under the ordinary treatment with antiseptics. Inject them with any of the solutions of the analine stains mentioned above, and introduce the pencil tip applicator and treat for five minutes, repeating the treatment every other day. In these cases the plain unprismatized applicator should be used.

As an adjunct to surgery in wounds following the removal of carbuncles by electrocoagulation, or cancers that have been removed by the same method, or any open wound, I know of nothing that so much improves the healing process and makes the epidermization progress *pari passu* with the deeper structures as does the water-cooled ultra-violet lamp for one to two minutes at six-inch distance with open window and repeated every other day.

Ulcers offer another field for the use of the water-cooled lamp, and since time does not permit of further elaboration on this important subject, it may be said that any infected condition that can be reached so that the rays may be brought in direct contact with the wound will be benefited by its use.

A Physical-Therapy Department for a 200-Bed Hospital[1]

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A QUESTIONARY sent out by the American Medical Association to 6,807 hospitals asking whether they had a physical-therapy department was answered in the affirmative by 2,091.

An analysis of the data thus obtained proved that physical-therapy departments are geographically evenly distributed and that they appear to be most numerous in the industrial states. In detail, the specialty hospitals having physical therapy are as follows: 42 of 62 orthopedic hospitals, 20 of 168 industrial hospitals, 150 of the tuberculosis hospitals, and of the 4,322 general hospitals in the United States, 1,506 or more than one third report physical-therapy departments. It is obvious from this report that physical therapy is an accepted therapeutic adjunct, and we need not concern ourselves with any discussion which would consider the virtues, uses, and abuses of the various forms of physical therapy. We shall, therefore, limit ourselves strictly to the aspect of the problem which deals with the planning of a physical-therapy department for a hospital.

Planning the Department

In planning a physical-therapy department, the following factors must be considered; namely, the attitude of the staff toward this relatively new mode of therapy, the obtaining of a competent director of the department, the class of patients the hospital accommodates, that is medical, surgical, or industrial, the location and amount of space available, and whether the revenue the department will produce will justify the expense of its installation.

The members of the hospital staff should first be consulted and their attitude obtained. This is of great importance if one remembers that the patients to be treated will be referred to the department by the staff and that the success of the department is assured only if they react favorably. It should be brought to the attention of those who may oppose physical therapy that no modern hospital is complete without such a department, and that physical therapy administered under the direction of a competent trained physician will offer a much-needed addition to the therapeutic measures already at their disposal.

The director, should if possible, be obtained early enough to participate in the planning of the department. The director must, of course, be a physician who has had special training in physical therapy, and it is also essential that he have clinical experience as well.

Technicians

A properly planned and organized physical-therapy department should have the necessary corps of technicians. They must be trained individuals who have a basic knowledge of anatomy and physiology in order for them to understand the application, uses, and effects of the various apparatus. Well-trained technicians are invaluable in carrying out treatment ordered, but they should always be under the supervision of the medical director. The requirements as outlined by the American Physiotherapy Association should be used as a guide in employing technicians.

The arrangement of the treatment rooms presents no serious problems in that as a rule there are no difficult technical or scientific phases to consider. This phase of the subject requires only a logical commonsense treatment and its solution will depend upon the bed capacity, the type of work done at the hospital, the number of outpatients and the amount and location of available space.

While a complete physical-therapy department embraces massage, mechanotherapy, hydrotherapy, heliotherapy, and electrotherapy, and the best results can be

[1]Read at the 13th annual convention and 2nd annual clinical congress of the Catholic Hospital Association, held at Cincinnati, Ohio, June 18-22, 1928.

obtained only by a scientific application of all those agents, the expense of instituting a department incorporating all these methods of treatment would be out of proportion to the revenue produced in a hospital of 150 to 200 beds. It is therefore best to begin with a smaller department but to plan its location in a manner which will permit its enlargement should more space be desired at some future period. In a general way, the location of a physical-therapy department should be in a well-ventilated part of the hospital near such plumbing which will permit the installation of hydrotherapy.

Survey of Locality

One cannot wisely determine the amount and type of equipment necessary until a survey be made of the type and number of prospective patients. The Council on Physical Therapy of the American Medical Association is, at present, engaged in the standardizing of apparatus. While this work is not as yet complete, still it is best to follow the recommendations of the council in the selection of apparatus.

While electrotherapy plays an important rôle, one must not lose sight of the fact that muscle training and exercise are also of great importance. The apparatus necessary for the latter is inexpensive and some of the devices can be made under the supervision of the director of the department by the carpenter employed by the hospital.

It is also important to know the source and the percentage of hospital and outpatients. This data will serve as an index to the number of treatment rooms necessary and their proper and most practical arrangement. The following table of treatment ratio can be utilized to determine approximately the quantity of apparatus required. One must, however, bear in mind, that these figures are but average and that many conditions may arise which would influence the treatment time.

FIG. 1. ELECTROTHERAPY

FIG. 2. ELECTROTHERAPY

Type of Apparatus	*Patients per Hour*
High Frequency	2 - 3
Sinusoidal	3 - 4
Galvanic	4 - 5
Air-cooled ultra-violet	4 - 5
Water-cooled ultra-violet	15 - 20
Thermotherapy	2 - 3
Massage	5 - 6
Whirlpool bath, arm or leg	2 - 3
Muscle training	Indefinite

This list of equipment with the exception of the water-cooled ultra-violet embraces the necessary efficient working apparatus for a physical-therapy department of a 150- to 200-bed hospital.

The problem of arranging the treatment, examining, and waiting rooms is practically that of eliminating unnecessary traveling and exposure of the patient. The available space should be measured and divided into booths five feet wide and seven feet long. This will give ample room for the apparatus without interfering or crowding the attendant and the patient. (Fig. 1.) If no examining room and office is available in connection with the department, adjoining space should be allowed for the purpose of permitting suitable privacy. While a separate reception and waiting room is desirable, the

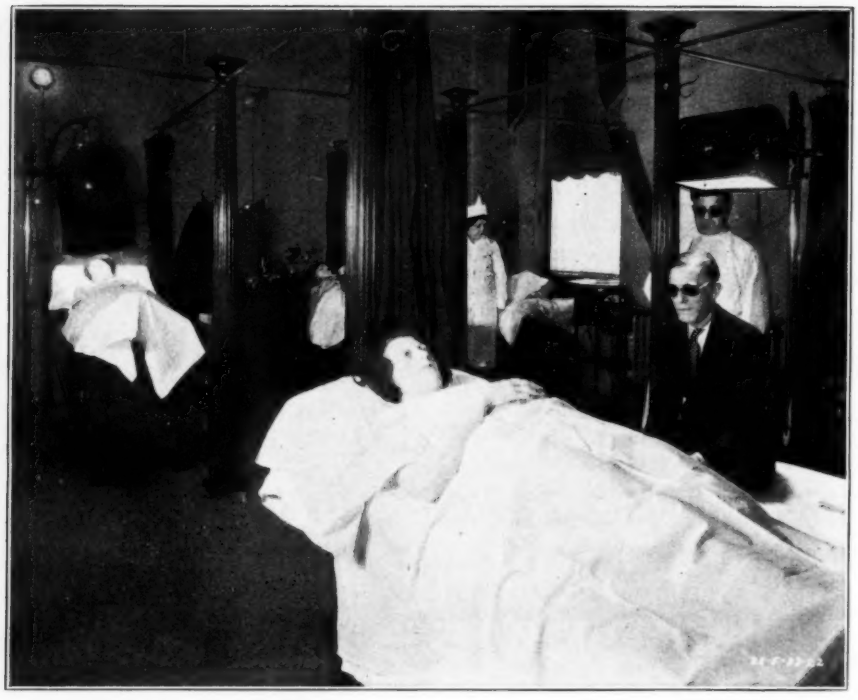

FIG. 3. LIGHT THERAPY

hospital corridor can very conveniently be used to furnish this accommodation.

Each treatment room or booth should have electric power consisting of two 20-ampere receptacles fed from a line of full 10-ampere capacity. Such lines should be individual to the booth and separately fused at the distributing panel. Practically all physical-therapy equipment consumes not more than 10 amperes and for those few instances where this amount is exceeded, the 20-ampere line will supply adequate power, assuming in such cases that but one receptacle is used.

Attend to Ventilation

The matter of ventilation is an important one inasmuch as most treatment rooms are small and the patients may remain in them for a period of from fifteen minutes to an hour. It is essential, therefore, that due consideration be given to the proper aeration of all the rooms.

Closets for clean and waste linen, or linen chutes together with closets and storage facilities for minor surgical dressings are also a requisite and this space should be located centrally for utilization in connection with all sections of the department.

Tables 30 inches high, 25 inches wide, and six feet long made in such a fashion that the head rest can be elevated and containing compartments are essential. (Fig. 2.)

Since hard floors produce foot strain, the floor should be covered with some material as linoleum or a rubber composition.

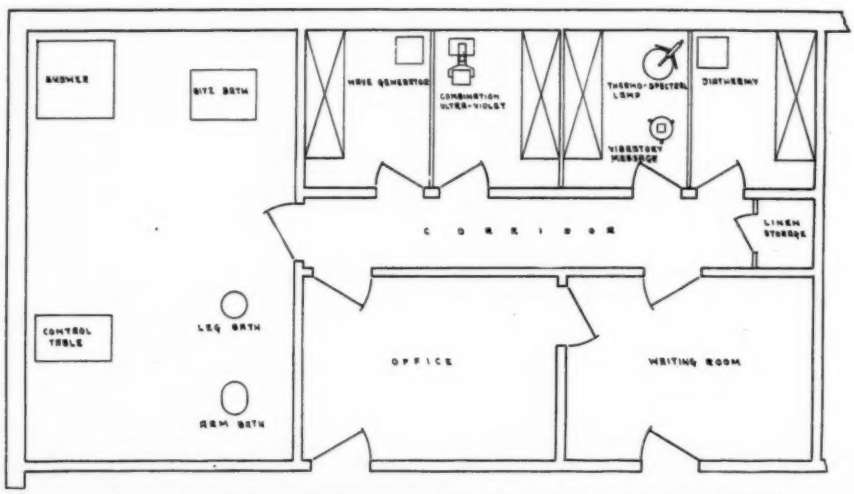

FIG. 4. PLAN FOR COMBINED ELECTROTHERAPY AND HYDROTHERAPY DEPARTMENT

A complete set of records should be kept, and the technician be made responsible for them. The records should show the diagnosis, condition of the patient at the time of beginning treatment, the type and number of treatments, progress made, and amount of money paid for the treatments.

into three booths, each five feet wide and six and one half feet long. Instead of using piping to divide the room into booths, four ornamental wooden posts were used and curtains were draped between the posts and the wall. Blue curtains were chosen because it has been conclusively shown that this color has a sedative effect

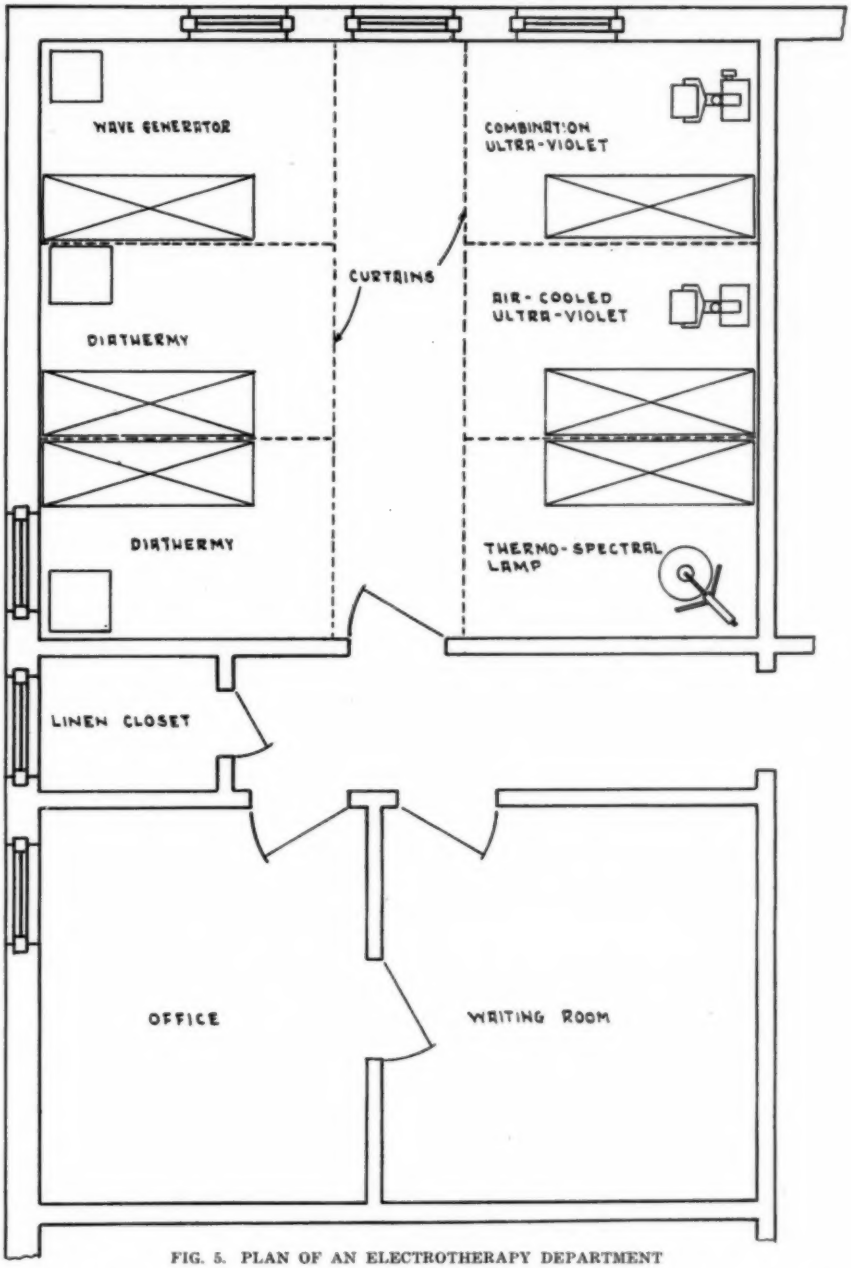

FIG. 5. PLAN OF AN ELECTROTHERAPY DEPARTMENT

It will be well to cite for the purpose of illustration the problem faced by a 150-bed hospital with which I am associated in Chicago. A space 17 feet long by 15 feet wide was alloted for the purpose of installing physical therapy. The doors to this room were centrally placed. From these doors to the opposite wall a space of three feet wide was alloted for use as a corridor. On each side of the corridor the space was again divided

on excitable patients. Brackets were placed on the posts for the patient's clothing. This arrangement makes it possible for each booth to contain all the necessary linen and appliances as well as to serve as a dressing room for the patient. (Fig. 3.)

While the foregoing description of a physical therapy department might easily be acceptable where the available space is limited, it is, of course, obvious that

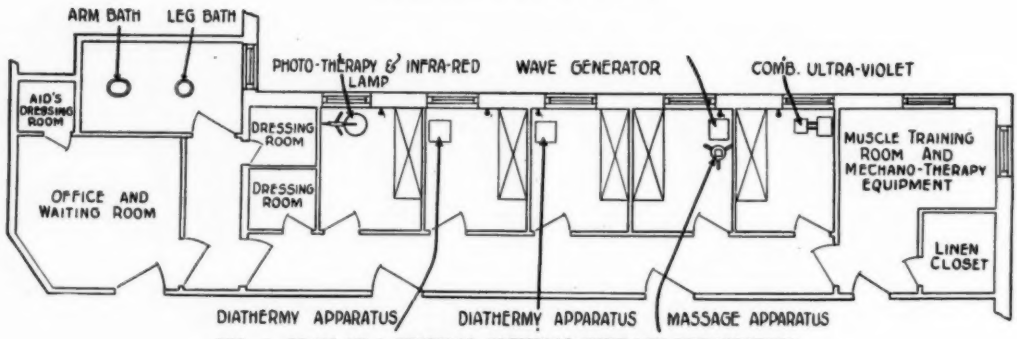

FIG. 6. PLAN OF A GENERAL PHYSICAL-THERAPY DEPARTMENT

where no such limitation exists other arrangements are possible. For this purpose three plans are submitted; two for a hydrotherapy and electrotherapy department (Figs. 4 and 6) and the other one for an electrotherapy department alone. (Fig. 5.) Dimensions are purposely omitted as this will depend upon the amount of space at hand.

Conclusion

It is not the purpose of this discussion to consider all of the aspects involved in the institution of a physical-therapy department. Time does not permit the consideration of many of the angles which should be considered. We have therefore attempted to discuss only those problems with which one is confronted in planning the arrangement of apparatus and treatment rooms. To this end the division of the available space, selection of a director and technicians, choice of apparatus, etc., are considered in brief.

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Physical-Therapy Departments in Hospitals. Jr. A. M. A. Vol. 90, No. 12, March, 1928, page 915.

Planning a Physical-Therapy Department[1]

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WE are now ten years past the greatest revival of physical therapy that the medical world has ever seen, and today physical therapy is on a better basis than it has ever been. It is now recognized that it is not a specific for any medical or surgical condition but that it is capable of benefitting along with other medical and surgical treatment a wide range of conditions. Therefore, most hospitals need some form of physical therapy.

Hospital administrators are confronted with the following preliminary problems about this department: (1) What constitutes an adequate physical-therapy service for their hospitals? (2) What service will this department render for the patients' betterment, particulary the class of patients in this hospital? (3) Is the expenditure justifiable inasmuch as there are many places where additional equipment might be used advantageously?

Making a Survey

These questions must be answered separately for each hospital and can be answered only by a careful survey of typical cases in this hospital. For instance, even in special hospitals the class of cases makes a difference. A tuberculosis hospital with a majority of surgical tuberculosis cases will need more arrangements for ultra-violet radiation than one with mostly pulmonary types. A survey should include a numerical list of the various cases treated, giving the diagnoses. This should be submitted to a disinterested physician or an association. The reply should include bibliographies and references, as well as abstracts of articles obtained from accredited medical literature which have a particular bearing on your cases.

It should attempt to give a complete synopsis of the physical-therapy problem covering every detail by reference to literature. Also, a recommendation for the space, and planning of equipment based on the findings of the survey, giving floor plans, etc., as used by other hospitals of the same character and size.

For your association, the Service Bureau of the Catholic Hospital Association will be glad to make this survey if you will present your cases in the following manner, in which columns one and two are filled out by the hospital from its last annual report, giving number of cases of each diagnosis and columns three, four, and five, are for the answers.

Survey for a Physical-Therapy Department

....**Hospital** .....**City**

No. of Patients	Diagnoses	Is Physical Therapy Useful?	Form of Treatment	References in Literature

As the physical-therapy laboratory takes its place as a recognized revenue-producing department of the hospital or clinic, it is essential that it be intelligently planned. An efficient arrangement that permits the maximum possible use of a given amount of apparatus with a minimum of fatigue to the attendants will be effective not alone in revenue, but particularly as a community therapeutic agency.

Choosing Director and Technicians

The department should have the necessary trained technical staff. Well-trained technicians are invaluable, not only in carrying out treatment ordered, but in ob-

[1]Read at the 13th annual convention and 2nd annual clinical congress of the Catholic Hospital Association, held at Cincinnati, Ohio, June 18-22, 1928.

serving and reporting symptoms and reactions to treatment. They should always be under the supervision of a medical director. Too many hospitals have in the past met with discouraging results in a physical-therapy department, after making a sizable investment in equipment, simply because of untrained personnel. Some of the routine work in this department could be done by pupil nurses. Nurses in training should have one or two months' assignment to the physical-therapy department during their course of training.

Much of the success of a hospital physical-therapy department will depend upon the man who is selected to direct it. It has been noted that hospitals which have selected such a director from their own staff often encounter difficulty due to the fact that one staff physician is reluctant to refer his patients to another doctor whose methods may be effective in diverting such patients to his own private practice. You will appreciate that this is a subject that requires extreme diplomacy in presentation, but it is a matter which must be carried in mind as it will have much to do with the ultimate success of the department.

One logical selection of a physical-therapy department director would be a young progressive doctor who is about to complete his internship in the same hospital which is considering the installation of a physical-therapy department. This doctor should be sent to take a postgraduate course in a medical school. Such a man would be familiar with the hospital staff and would not have outside practice to jeopardize the interests of the staff physicians who refer patients for treatment to his department.

Choosing Equipment

The layout presents no serious problems in the sense that there are difficult technical or scientific phases. The subject requires but a logical common-sense treatment. Such survey as we find necessary is due largely to lack of standardization of apparatus and its use. Some authorities believe that a certain modality is indicated in the treatment of a specific condition, while others of equal standing put their faith in another therapeutic agent.

These conditions make it necessary that the preliminary survey, as to amount and kind of treatment, be carried out with great thoroughness and diplomacy. Successful economic and therapeutic results are going to depend not alone upon the medical knowledge of the director of the department, but to a great extent upon his broadmindedness, tact, and executive ability.

This survey will cover many things, but only two particularly concern the layout problem. These are: First, the kind and amount of work as indicating the list of equipment that will be required, and second, the source of the patients, whether they are largely from within the hospital or from outside, that is, outpatients.

The list of equipment resulting from the above study may not be immediately available due to various causes, the two principal ones being lack of funds and lack of space, but no matter what obstacles are met in the organization of this department, that of insufficient floor space should be surmounted. Often a small amount of carefully selected apparatus will provide the funds needed to complete the department, whereas any attempt to overcome limitations of space will generally result in decreased efficiency due to a congested or divided department. Always give consideration to probable growth.

Planning the Layout

The actual problem of arrangement is practically that of eliminating all unnecessary traveling on the part of patients and attendants. This problem can be understood best by following the patient in his movement through the department, and in order to cover all the necessary facilities the most complicated condition will be considered in the following outline:

All patients will be received in a reception or waiting room, the size of which depends not alone on the number of patients, but rather on the proportion of outpatients. In this room will be an attendant and, if necessary, files for patients' records. Where the number of outpatients is small or the vast majority come from wards or rooms within the hospital, the waiting room is almost unnecessary. Probably the corridor can furnish what little accommodation of that sort may be needed. The patients will in such cases bring with them their records from the other departments of the hospital and only such facilities of this nature need be provided as the physical-therapy department requires for its own purposes.

At this point, it is well to consider the question of sex separation. There are certain classes of diseases, treated largely by physical-therapy agencies, that may render desirable duplication of part or even the whole departmental facilities. In some cases, this purpose may be accomplished by utilizing different hours for men and for women. While this question offers no particular difficulty in the laying out of the laboratory, it should always receive consideration.

From the waiting room, the patient may go to either a dressing or examination room. Again, the amount of these facilities depends on the number of outpatients. Those coming from within the hospital, on carts, on chairs, or on foot, are usually so dressed as to require no dressing rooms as examination has been performed in another part of the hospital.

The next station for the patient will be one of the treatment rooms, which for purposes of discussion are divided into muscle training, hydrotherapy, and various small ones utilizing the electrical apparatus.

The muscle-training room should be of sufficient size to contain all the various types of equipment and still have provision for additions. It seems probable that there will be increased attention given to this class of work, which will result in additional types of equipment.

There is little, if any, need for subdividing the muscle-training room. The work does not require dis-

robing to any degree and it is also possible that a certain amount of sociability on the part of the patients may be beneficial.

The size and arrangement of the hydrotherapy room depends almost entirely on the amount and variety of equipment and before anything definite can be done with this space the equipment problem must be very carefully settled. The question of privacy enters into this class of work to a much larger degree than any other treatment function and, in addition, there is the matter of waterproofing partitions, floors, etc. It is recommended that the services of hydrotherapy apparatus manufacturers and specialists be utilized in connection with this room, when extensive.

When the hydrotherapy comprises only the whirlpool baths, the problem is very simple. The baths are set on the floor with sufficient space around two sides and one end, the other end being occupied by piping which will consist of water supply and waste. Such privacy as is desired can be satisfactorily obtained by curtains, although partitions can be used if desired. The curtains or partitions and the floor should be waterproof to the extent of those in the average residential bathroom, unless unusual precautions are necessary.

The majority of all electrical apparatus is used in small rooms, booths, or cubicles, which at the minimum will contain one cot or plinth and one piece of apparatus. Larger rooms and more furnishings are entirely in order when conditions so indicate. With the most exclusive clientele it may be desirable to arrange the clinic like a hotel, each room being provided with a closet, toilet, and all possible facilities. In such a case, dressing and examination rooms are unnecessary, the patient going direct to the assigned room and all examination, treatment, etc., will be done therein.

Ordinarily this degree of refinement is uncalled for, but booths large enough to contain in addition to the above minimum a coat rack or tree, a chair, and a small stand for minor surgical dressings are more than desirable.

The details of walls, partitions, etc., will depend to a large degree on the amount of money available and upon the individual preferences of those in charge. There is a wide range of material and construction available, permitting the satisfactory meeting of most every requirement.

In conclusion, it is to be remembered that we must not let enthusiasm for a new idea make us believe that we have a cure-all in physical therapy but it is to be recognized that a modern hospital must provide all the scientific methods for aiding cure, shortening temporary, and preventing permanent disability. Therefore, all hospitals need some form of physical therapy, and the requirements can be determined only by an individual survey of each hospital.

THE PURPOSE OF THE SANATORIUM

M. A. Cunningham, M.D., Med. Dir., Holy Cross Sanatorium, Deming, New Mexico

The purpose of the sanatorium is threefold. First, it aims to receive as patients persons in the early stages of tuberculosis and by means of proper treatment and suitable training arrest their disease, increase their resistance, accustom them to correct ways of thinking and right modes of living, thus enabling them to successfully continue their ordinary life's work.

Second, the sanatorium purposes to check the spread of tuberculosis by removing infectious cases from their respective families and communities and through proper care and instruction render them not only noncontagious to others but also propagators of the gospel of prevention.

Third, the sanatorium continues its interest in those patients who have been dismissed as arrested cases and by vigilant cooperation aids them in the retention of health.

The sanatorium endeavors to receive patients in the first stages of the disease. Early diagnosis is made possible by those sanatorium doctors who willingly give their services to the clinics; by those sanatoriums which extend open invitations to doctors to visit their institutions and study the disease; by courses offered senior medical students in the diagnosis of tuberculosis, and by impressing the patients themselves with the necessity of an early diagnosis. Other allies, such as tuberculosis associations, nurses' association, and welfare leagues, hold clinics and distribute information stressing the importance of early admission to the sanatorium.

After the patients have been received, the sanatorium staff uses all the means within their power to make the surroundings suitable, comfortable, and pleasant.

A standard treatment, educational and curative in character, is followed in most sanatoriums. All authorities agree that complete rest of mind as well as of body is one of the essential requirements in the successful treatment of the disease. As adjuncts to rest, pneumothorax and heliotherapy are used and such medicine and surgery as deemed necessary.

The secret of the cure, however, is the wise and experienced regulation of all the activities of the individual. This may mean rest, more rest, absolute rest, little exercise, more exercise, or unlimited exercise, but it always means regulation.

The sanatorium being a community, a hospital, and a school, having purposes and ideals to fulfill, must prescribe rules and instructions for the guidance of its people. A copy of these regulations initiates newcomers into the ways of a sanatorium and serves as a textbook in the training of the patients.

Some of the rules may seem extreme and perhaps they are, but each had a particular purpose in view. Take, for instance, the rule that all patients must carry a sputum cup wherever they go. Very few of the patients, it is true, will carry a sputum cup after they leave the sanatorium, yet if they are sufficiently impressed with an overemphasis of this rule, they will be more likely to dispose of their sputum in a careful manner.

To bring about a cure the sanatorium must have discipline but this will be of little value unless each patient practices self-discipline and self-denial. One who is patient, persevering, faithful, and conscientious gets better, while one who is impatient, slipshod, and obstinate does not. Doctors and nurses are most willing to direct but they should not be obliged to drive sick people along the road to health.

The second purpose of the sanatorium, prevention, is almost entirely a matter of routine teaching. Patients are instructed, for example, to cover the mouth and nose with a gauze or paper napkin when coughing or sneezing. The nurses insist that the sputum cup be used for expectoration and that the filler be changed daily, the old one being destroyed immediately. Frequent talks are given on the danger of infecting young children and methods of preventing the spread of tuberculosis are discussed.

The difficulties attending the supervision of arrested cases are evident. Here, again, the sanatorium must depend largely on the practical training of the patients while resident in the institution. Patients are warned of the dangers to health which may beset them after their discharge. They are advised as to the activities in which they may participate whether at work or at play. In fact, everything depends on the patient. If he has learned his lesson carefully, if he faithfully lives up to the instructions given him, there is every reason to suppose that he will retain his regained strength. Sanatorium doctors are always glad to give advice to discharged patients and most sanatoriums attempt to follow up their arrested cases and discover if they are pursuing the proper course and advise them accordingly.

Studies in Thermopenetration by High-Frequency Currents*

E. N. Kime, M.D., Director, Physical Therapeutics, Indiana University and Indianapolis City Hospitals

THERMAL energy is indispensable to life, but is so universally available in the form of ordinary conductive heat as radiated from various heating devices—steam, hot water, or electrically energized radiators—that it is often utilized in a purely casual manner, and without careful consideration of its physiological effects, indications, limitations, and even contraindications. Much more necessary, however, is a careful study of the causation, modus operandi, and therapeutic effects of the various forms of endogenous heat, and particularly the effects produced by the passage through the body of those high-tension, low quantity, oscillatory currents of radio frequency, commonly termed high-frequency currents.

An increasingly voluminous literature, mostly hyperenthusiastic but often sadly hypercritical, bespeaks a widespread interest and even exploitation of diathermy. This term, meaning literally, "to heat through" was coined by Nagelschmidt in 1908, and is an effort to indicate in one word the process whereby electrical energy is converted into caloric energy within the tissues themselves, due to their resistance to the passage of a biterminally applied suitable high-frequency current. This *conversive* heat is measurable by thermometer or thermocouple placed within the tissues of experimental animals or even human subjects, and is as yet the only objective criterion of definitely proved value upon which we can rely in our study of the effects of so-called diathermy.

Internal Heat Effects Uncertain

"The magnitude of the current, the resistance of body tissues in the path of the current, the general heat equilibrium of the body, and the distribution of the current, the current density or the amount of electrical units per square section of the transmitting medium are important factors in the production of heat." Bettman and Crohn, as a result of their experiments on thermopenetration of agar, meat, masses, anesthetized animals, and cadavers, conclude that with the present routine application of electrodes, and with the apparatus and technic which they used, that "it seems impossible to focus the site of heat in any given internal viscus" and give as factors pointing against a central heating of tissues: (1) Current density, which is always greatest near electrodes, and (2) skin effect, which is dependent on relative specific resistance and specific conductivity of the tissues. It is probable that this is a factor in keeping the current near the surface of the body.[1]

Factors in Conducting Heat

Brown et al[2], in experimental observations on the effect of diathermy on the circulation of rabbits and dogs, using both laterally placed and anterior-posterior electrodes, activated by a high-frequency machine of standard make, and administering dosages of current for the most part of greater quantity than that ordinarily administered clinically, give their findings, as follows:

"Elevation of temperature in tissues adjacent to the heart itself was about 1.5 degrees C. In repeating observations, a hot-water bottle being used as the source of heat, it was found that an elevation of temperature also occurred in the tissues adjacent to the heart, but to a less degree than with diathermy. Therefore, apart from the effect of the current itself it would seem that conduction of heat from the skin surface is a factor in the production of deep temperature, in the living animal. This conduction of heat is a result of two factors: First, physical contiguity of tissues, and second, actual transference of heated blood from the involved capillary bed to the heart through the venous circulation." They also discovered that diathermy through the chests of dead animals gave a much more marked elevation in temperature of deep visceral tissues as compared to that found in living animals, and emphasizes the rôle of the circulation to the prevention of dangerously high deep visceral heating with diathermy, by the carrying off of the heat produced.

Brown and his associates also verified the findings of Bettman and Crohn with regard to so-called skin effects, and found that, in order to produce a rise of 1.5 degrees C. in the tissues adjacent to the heart, it was necessary to use a quantity of current sufficient to increase the subcutaneous temperatures by at least ten times that much. This would be above the threshold of safety to the skin under the electrodes (45-50 degrees C.) and would not uncommonly produce sloughing. The conclusion would seem logical "that appreciable changes within the chest (of normal animals and with the technic employed) were not obtained except when such intense diathermy currents were employed that serious burns and sloughing of tissues would be liable to occur."[2]

Various Experiments

Binger, et al, in an experimental study of diathermy, conducted at the Rockefeller Institute of Medical Research, showed that in normal animals the rectal temperature can be elevated by the passage of high-frequency currents, but that during life the intraabdominal and intrathoracic temperature can be increased only slightly above the rectal temperature. On the other hand, the lung temperature, which in the anesthetized dog lies between 0.3 and 0.4 degrees C. below the rectal temperature, shows a reversed relationship to the rectal temperature in diathermy of the lung, with pas-

*Read at the 13th annual convention and 2nd annual clinical congress of the Catholic Hospital Association, held at Cincinnati, Ohio, June 18-22, 1928.

sage of current strengths equivalent to those used in therapy. Immediately after death, the temperature rises abruptly in the deep tissues between the electrodes. Temperatures were accurately determined by the thermocouple method.[3]

The same workers have also shown that prevention of access of air to one lung, while its circulation was intact, resulted in little or no change in the rate of the heating of the lung by the diathermy current. Coincident diathermy of the lung, with occlusion of a main branch of the pulmonary artery, or of the entire hilum —thus occluding the bronchial vessels and pulmonary vein, results in a precipitous rise of temperature comparable to that seen in the other lung after death with continuance of diathermy.

A résumé of the findings of these three groups of investigators working independently, shows uniform agreement in the following findings regarding the passage of high-frequency currents of safe therapeutic quantity:

1. During life the intraabdominal and intrathoracic temperatures can be increased only slightly above the rectal temperature.

2. After death, or with interference with the circulation, correspondingly marked increase of deep visceral temperature results.

3. The implication, that the circulating blood carries away the heat produced in the lung is obvious.[5]

4. High-frequency currents like all other currents follow the path of least resistance, hence the greatest current density will occur within the subcutaneous tissues immediately beneath the electrodes, and accurate focusing of the point of greatest heat within the depths of the body is impossible in normal animals.

These three groups of investigators are in disagreement in the following particulars:

1. The first group were unable to increase the visceral temperature over the rectal temperature with diathermy through the abdomen with the apparatus and technic used. The second group using different apparatus and with a technic admittedly more drastic than therapeutically practicable were able to increase the rectal temperature but slightly, and the deep visceral heat a full degree above the rectal temperature. These findings were corroborated by the third group, using densities of current not above physiological limits.

2. Moreover, and this is the most significant finding in the entire series of experiments, a specific deep-heat effect was invariably produced when diathermy was exhibited through areas with impaired circulation, with consequent immediate fall in temperature when circulation had become reestablished. The importance of this finding as a guide to the clinical application of diathermy is self-evident.

The Author's Experiments

6. My own experimental work in electrothermic penetration, dates back to the early part of 1926, and was done in the laboratories of Surgical Pathology and Biological Chemistry at Indiana University through the courtesy of Professors Gatch and Turner. We have attempted to determine the answer to the following questions:

1. Does internal heating really occur?
2. Does the current actually pass through the body?
3. What objective data besides demonstrable heat elevation, is there to show that high-frequency currents produce definite effects upon the deeper visceral tissues?

In order to simplify the problem, we used anesthetized animals, (dogs) with hair clipped and shaved over the thorax and abdomen, and used block-tin electrodes without intervening soap lather or electrode compound. The metal was placed snugly in contact with the skin, both anteroposterior and lateral positions were used in different animals, and the current density was never allowed to exceed 100 MA per square inch of electrode surface, the upper limit of safety. The oscillation frequency was checked by wave meter and carefully recorded. Frequencies of over a million, three quarters of a million and a half million were used at different times, and the efficiency curve of the various frequencies determined on a basis of both thermal elevation and time factors required to produce a given degree of heat elevation in the liver, rectum, subcutaneous tissue beneath the electrode and in the skin. Determinations of the blood calcium, and blood sugar were made before anesthesia, after anesthesia, after the production of 1 degree C. rise of liver temperature above the rectal, and after death.

Our findings agree substantially with those of Binger and his associates. Not only were we able to increase the rectal temperature by diathermy through the liver, but also we were able to increase the temperature of the latter a full degree centigrade above the rectal. However at no time during life were we able to exceed this within the liver, and the thermal gradient of greatest heat in the subcutaneous tissues, next in the skin itself, next in the deep viscus and lowest in the rectum, agreed with those of Binger and his associates, and except for the relationship between the rectal and visceral temperature, the findings were identical with those of Brown and his associates and also with Bettman and Crohn. There was, however, this difference, that our findings more nearly agreed with both Brown and Bettman, when we used currents of extremely high frequency, and when we measured the heat not within the liver itself but in the abdominal cavity just outside this viscus. With currents of three quarters of a million in frequency or less, and determinations within the hepatic substance itself, our findings were almost identical with those of Binger and his associates. These findings may be interpreted in two ways:

1. The lower the frequency, the greater the penetrative property of the high-frequency current, and the less the tendency toward so-called "skin effect."

2. The liver contains, normally, at least one fourth of all the blood and in laparotomy there is a tendency

toward stasis within the abdomen, which may readily progress to produce surgical shock.

Hence the clinical efficiency of diathermy through the liver in the prevention of surgical shock.[7]

The increased blood volume in the liver probably produced that amount of current density—not rapidly enough carried away by the blood to have given us the definitely increased visceral heat obtained with diathermy given as in the clinic.[8]

Other findings coincident with increased hepatic temperature, were no change in blood pressures, no shock, no change in blood calcium, but increased blood sugar. The latter would indicate stimulation of liver function, but the experimental data is as yet too meager for us to draw any definite conclusions except that:

1. Diathermy through the liver, given with precautions as to technic of application, not to exceed physiological limits within the skin, produces a definitely measurable increase of heat.

2. Although at all times, and with all frequencies the subcutaneous temperature is much higher than the deep visceral temperature, this difference was much less marked when frequencies of lower rate were used, other factors such as electrode surface, amperage, and voltage being kept constant.

3. Current density as regulated by the circulation is the most important factor in the production of deep visceral heat, other factors being equal.

4. Quoting Binger, "We may say in answer to our original questions, that we have found no evidence of any significant degree of local heat within the lungs (or other viscera) except when their circulation has been impaired or interrupted, and that all our experiments point to the fact that these currents actually pass through the deeper structures of the body."[9]

5. Quoting Burton-Opitz, "Why speak of *degrees?* (rise of temperature) I do not see why the temperature should be raised four or five degrees because cellular oxidations are easily influenced by tenths of degrees. Even very slight changes in temperatures often give results entirely out of proportion to the change."

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1928 GRADUATES, ST. ELIZABETH'S HOSPITAL, GRANITE CITY, ILL.

Hospital Progress

EDITORIAL EXECUTIVE COMMITTEE

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REORGANIZATION COMMISSION OR COMMITTEE

At the Cincinnati convention, held June 18 to 22, a reorganization commission or committee was authorized with C. B. Moulinier, S.J., former president of the Association, now executive director, as chairman. Much thought and planning has been going on, the results of which will soon be made known to the whole membership.

It should, however, be stated now that the success of this constructive and progressive work will be attained in almost direct proportion to the active part the whole membership will take in the movement. All the Sisters, doctors, and nurses really interested in the betterment of hospital work in our country must feel a serious obligation to aid in this upward and onward movement. As a first effort, all, in each hospital, should think and should talk amongst themselves about their hospital problems. Keen and constructive analysis of the whole hospital's activities as a complex unit, functioning from day to day, should be subjected to the closest scrutiny. What about organization, management, cooperation? What about the relation of the hospital to the community where it is? to the medical profession? to the nursing profession? Is there an unmistakable urge in all, singly and as a whole personnel, for better achievement? How much unselfishness actuates all or most of those who are responsible for the best hospital care of patients? Is the scientific spirit of the hospital all it should or could be? Is the nursing in quality and effectiveness what patients need and doctors desire? If not, why not? Are the business affairs of the institution so handled that they would receive the commendation of a high-grade certified public accountant? Is there harmony and peace and wise loyalty prevalent in the institution? What about the ethical tone and religious atmosphere? Are your records and staff conferences and ratio of autopsies up to the standard?

If things are as they should be, who or what deserves the credit? If not, who or what deserves the blame? Study, investigate, scrutinize, and analyze until a satisfactory answer is received to some of the questions set down above. Write about your hospital after this mental toil. Find out what is good and what is defective. Tell the hospital world; write to HOSPITAL PROGRESS; suggest plans and methods that have helped or hindered in your hospital experience. Arouse again your ambition and enthusiasm and divine discontent so that we may truly initiate and carry on during this year a *NEW ERA*.

Pick out four or five of the most active hospital thinkers and writers within your institution and send their names to the executive editor of HOSPITAL PROGRESS so that when the final plans for a reorganized editorial staff are submitted you may be ably and adequately represented. If you do not do this and do it soon, you will have yourself to blame for not taking part in this deep, high, broad, and strong movement for a better hospital membership and a finer hospital spirit in our country.—*C. B. M.*

UNWISE INFLUENCE

It is the superintendent of nurses who is, after all, responsible for the selection and education of the student nurses. Hers is the responsibility for sending out to the public each year a group of professional workers who will be ready, able, and equipped to take care of the sick. Just as it is a serious fault, for a medical school to turn loose on the public incompetent or unscrupulous practitioners, so, to a certain degree, it is a great fault for the school of nursing to give diplomas to girls who are not well enough trained nor well enough equipped with character and personality to give normally good care to the sick and the distressed.

The superintendent of nurses who keeps in her school a girl who is not qualified to become a worthy nurse is doing an injustice not only to herself and to the school, but to the public. It is her duty to judge objectively and to decide impartially, from the standpoint of the public good, whether the student gives fair promise of becoming a good nurse. But if this is the duty of the superintendent, everyone else has a corresponding duty of avoiding undue interference and unwise influence to keep a girl in a school of nursing when she is not fitted for that career.

It sometimes happens that family friendship or personal liking or some other motive foreign to the interests of future patients cause individuals, who have influence or authority, to request or insist that a girl be kept in a school of nursing, though the superintendent of nurses honestly judges that she should be sent away. Such unwise influence is a double misfortune. First, it is an injustice to the public, for when a girl who is not fitted for nursing is thus helped through by outside influence, she will never be a really good nurse and, therefore, her patients will inevitably suffer. But it is also an injustice to the girl herself, for to make a girl a nurse when she is not fitted for nursing is to pave the way to unhappiness and discontent.—*E. F. G.*

OUR SCHOOLS OF NURSING

There is much unrest of mind and not a little perplexity as to standards for our schools of nursing and yet, in spite of it all, there is a line of thought that should make clear a few principles and a definite line of action based on these principles.

Everybody who knows anything about the matter, or who thinks seriously on the situation, is convinced that our nurse schools are passing through a stage of evolution from a lower to a higher grade of admission

requirement, of teaching ability, and as a consequence, of the service looked for, expected, and even demanded, from the pupil nurse and the graduate. The national bodies of nurses, the state boards of nurse examiners, along with the medical profession and all hospital people, are as yet, not thinking in absolute or even close uniformity.

There seems, however, to be a very strongly growing conviction that the first thing to do is to raise the entrance requirements to a four-year high-school standard, regardless of what the state law may require. If all, or a great majority of the nurse schools, were to lay down this as a beginning standard, there would be a very definite step taken toward putting the school of nursing of our country on an academic basis. It may be well to note in this connection that, in almost every part of our country, girls who have the ability and the ambition to go forward with their education, find it comparatively easy to get a full high-school education. This gives warrant to the authorities of our hospitals for the demanding of a high-school entrance requirement. The National League of Nursing Education, I believe, unanimously endorses this requirement. The growing number of schools affiliated with colleges and universities for the combined five-year-training which would lead to a bachelor's degree, is, of course, helping the upward movement.

The national group of nurses, along with the state boards of nurse examiners, who necessarily keep close to the number and purposes of the growing profession, will, we may feel confident, make no serious blunder in furthering the upper academic trend in all the schools of nursing of our land. They will meet the difficulties and solve the incidental problems as they arise. We all want the most intelligent, skillful, safe, and sound nursing service to be had.—*A. L. B.*

GRATITUDE

"Were there not ten cured; where are the nine?" Perhaps in the whole range of sacred and secular literature, history, poetry, drama, and essay, there was never a more striking example and terse expression of what gratitude and ingratitude are. We all love gratitude; we all despise ingratitude. The quotation above gives us assurance that God Himself, our Lord Christ, appreciates gratitude, and to put it mildly, wonders at ingratitude. The Sisters in our hospitals, the nurses, the doctors, all have their impressions deep down in their souls of the gratitude and ingratitude they have experienced. Patients too, have their sense of gratitude. In fact, the whole world, all human beings in it, who have trudged along the pathway of life, have had experiences both of gratitude and ingratitude. Gratitude means to feel thankful for favors, to acknowledge what has been done for us; to try by look or word or deed to make some return for gifts or favors or blessings bestowed on us. The ungrateful man or woman is perhaps the most despised person in the world. Ingratitude usually is the outgrowth of selfish, narrow concentration on what concerns, what interest oneself; it is nearly always an indication of self-satisfaction, of disregard of others, which naturally leads to an overestimate of all that pertains to self, and the underestimate of others. Along with gratitude go kindness, considerateness of others, and effort to do for others because of appreciation.

Shakespeare has given the world a marvelous portrayal of the ungrateful Iago, the man of deceit and villainy and of lying destructive chicanery, the man who wrought to lift self to power and influence through the destruction of a kind, generous soul and the innocent Desdemona.

It is perhaps seldom that such an extreme example of unscrupulous malicious selfishness is found in the world, and yet even amongst seemingly good people, even amongst those who may have some good purposes, in fact, I believe, even amongst the good, better, and best of us, there lurk down in secret corners of our poor selfish natures hidden impulses of selfishness not always restrained, not always controlled, which at times assert themselves and bring about sadness and sorrow and spoiling of better things.

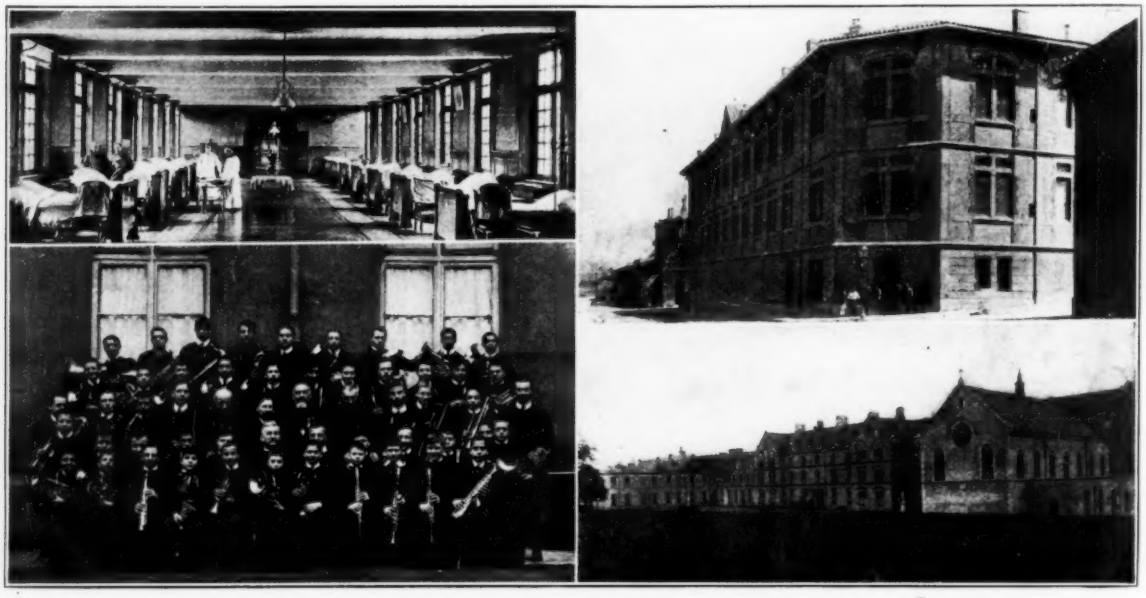
Does not ingratitude stalk about like a ghost in our hospitals, our organizations, in our friendships, in our holy works for God? Of course it does, we all know it. We think nurses are ungrateful; we believe doctors are ungrateful at times; we know patients are ungrateful now and then; and we know the public is ungrateful at times; and reversely, nurses, doctors, patients, and the general public may think us in our hospital work lacking in gratitude.

People work for us, do things for us, help us in many a large and small way, and if we are selfish, if we have hidden away somewhere a tendency to think more of self than of others, we are sure of being ungrateful either by our silence, or by unkind words, by attitudes of coldness, or, thank God rarely, by malicious, untrue gossip. In truth it must be said we may even go so far at times as to resort to underhanded ways and methods of trying to hamper, hinder, or destroy the good that others may be trying to do. If we could by some human process which might help our prayers and the grace of God to lift us above such things, our work for God and for our fellow human beings, no matter in what capacity, would bring more peace, more harmony, more cooperation; there would be more true, more lasting friendships. Earth would become like unto heaven; there would be less of hell on earth. Not only individuals but groups of people, organizations, institutions have their generous openminded, unselfish spirit, as well as their conceited, self-centered, and haughty attitudes which mark them in the estimate of observers as either grateful or ungrateful. God grant that most of us, that all the institutions of the Catholic Hospital Association, that our great sisterhoods conducting these splendid institutions grow and develop and cultivate an appreciation of gratitude to all and ingratitude to none.

Hospitaller Order of St. John of God

ST. JOHN of God was born on March 8, 1495, in Portugal. At the tender age of eight, he left his parents and went to Spain in the company of a Spanish priest. After a varied life of shepherd and soldier, he went to Africa with the intention of assisting the poor prisoners of the Moors, but on his way there he fell in with a Portuguese gentleman and his family, who was expelled from his native country. To this afflicted family our Saint gladly offered his gratuitous service, and this was undoubtedly the beginning of John's devotion in the service of his neighbor. The exiled family was recalled to Portugal, and John was advised by a Franciscan Father to return to Spain. Having arrived at Gibralter, he began to act the part of a dealer in religious books and pictures, which led him to visit the towns and villages in the south of Spain. One day, as our pious pedlar, as we may justly call him, was trudging along the open country, bending under his load, he observed a young lad of a noble and beautiful aspect, although poorly clad and barefooted. John in his compassion offered to carry him. Coming to a stream and being parched with thirst, John put down the child in order to go for a drink. At this moment, the Infant Jesus revealed Himself to him clothed in radiant light: He held in His hand a half opened pomegranate surmounted by a cross, saying: "John of God; Granada will be thy Cross," and then disappeared. John being near Granada repaired immediately to that city, where he began to lead a life of penance and austerity, but being advised by his confessor, Bl. John of Avila, John procured a house where he gathered the abandoned poor of the city, and in spite of many difficulties and oppositions he formed the first hospital of the future Order. He had few helpers at the beginning, but the angels of heaven came to his assistance by helping in the work of the hospital and bringing bread when required. Even Our Lord revealed Himself again to John in the person of a poor patient whom he had brought to the hospital. He proceeded to wash the patient's feet as usual, when, lo! he beheld the sacred Stigmata, and the Saviour then addressed him and said: "John, I have come to testify my gratitude to you for the care you take of my poor. All you do to them in my name, you do unto me..... I will be your recompense." John was highly encouraged by these words and continued his work with greater energy than ever, looking after his patients during the day and spending the larger part of the night in prayer. Soon he received a few companions whom he attracted to his hospital by his untiring zeal in works of charity and mercy; they formed the first community of the Order and placed themselves under the guidance and protection of their archbishop Don Guerrero

ST. JOHN OF GOD
Founder of the Order of the Hospitaller Brothers.



INSTITUTIONS CONDUCTED BY THE ORDER OF ST. JOHN OF GOD

Maison de St. Jean de Dieu
Lommelet-Marquette-les-Lille-Infirmere.

The Band, Crippled and Blind Boys' Home, 223 Rue Lecourbe, Paris.

Night Lodging for Men,
Hospital at Versailles.

House of St. John of God, Stillorgan, Co. Dublin, Ireland.

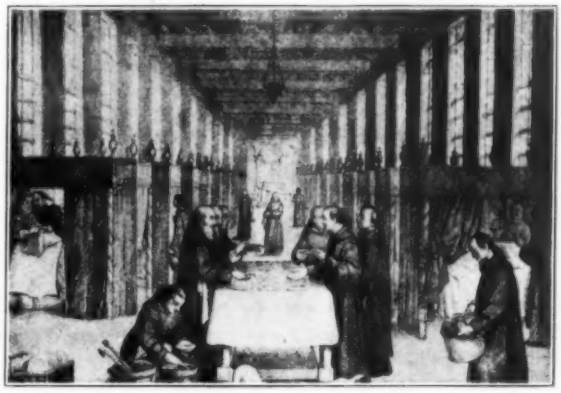
of Granada. After some years they established hospitals in several cities of Spain. St. John of God died in 1550 and was canonized by Alexander VIII on Oct 16, 1690.

The followers of St. John of God imbued with the spirit of their holy founder continued his works of charity, and in 1576, Gregory XIII called them to Rome where he built for them the Hospital of St. John Calybite in the isle of the Tiber. This same hospital is now the mother-house of the Order and the residence of its General.

St. John of God was canonized by Pope Alexander VIII, in 1690, and in 1898, Pope Leo XIII made him a patron of hospitals. His feast day is March 8.

The new Congregation was first approved by Quintus V. in 1586, and Paul V. formally approved the constitutions and raised the Congregation to the rank of a Religious Order strictly so called. The Brothers of St. John of God came to France in 1601 and had 39 hospitals at the time of the French Revolution, 1793. The Order was restored in France in 1824, and at present the French Brothers possess ten hospitals in France and Belgium.

The Order also possesses houses in Italy, Austria, Spain, Germany, Poland, Hungary, Mexico, Canada, England, and Ireland. The house in Ireland is located at Stillorgan, five miles south of Dublin, and is a private mental hospital. In this hospital, the novitiate for the training of English-speaking subjects was established in 1926.



THE BROTHERS DISTRIBUTING FOOD TO THE SICK IN CHARITY HOSPITAL, PARIS
From a Drawing of the 17th Century.

Besides mental hospitals, the Order of St. John of God possesses clinical surgeries, night shelters, convalescent homes, homes for incurables, for old men, for crippled and blind boys, and houses of rest for retired priests and laymen.

Recently a house of the Order was established in Montreal, Canada. The latter is known as the Refuge Notre Dame de la Mercie and is located at 385 St. Paul Street East.

Selecting and Training Radiological or X-Ray Technicians[1]

Edward C. Jerman, Chicago, Ill., President, American Radiological Technicians' Association

THE importance and value of X-ray work as an aid to the medical, surgical, and dental professions, from both a diagnostic and therapeutic standpoint, has been constantly and steadily increasing from the date of the announcement of its discovery, by Wm. Conrad Roentgen of Wurtzburg, Germany, Dec. 28, 1896, to the present time. It is the almost universal opinion, of those who have been engaged in this work, that its importance and value will continue to increase as time goes on. The three great essentials that contribute to success or failure are first the working equipment, second, technical procedure, and third, the interpretation of the film or radiograph or the application of X-ray energy in the treatment of disease. Working equipment and technical procedure are constantly being improved for the purpose of providing more information through the medium of the film or radiograph. The radiologist can receive only that information which the film or radiograph provides. The better the quality of the film or radiograph, the more information becomes available and the more important X-ray work becomes to all parties concerned. There is probably, as yet, only a small part of the X-ray work done that should be done.

The Technician Appears

At first, professional men did most of the technical work but as the demand for X-ray work increased they began to draft laymen and women to carry on the technical part of the procedure. Technic requires time, as careful attention must be given to the many details involved. It was soon found that carefully selected laymen and women could qualify, with a reasonable amount of training, to render some assistance. As a result several thousand laymen and women (mostly women) have been drafted for this form of service. For many years there were no schools for the training of technicians, consequently they usually had to receive such training as their employers could provide. Through lack of control of the energy used, technic was mostly guesswork and if one succeeded in acquiring some skill, with much practice, information could not be successfully transmitted to others. Skill could be acquired only with much practice and experience. Even under such adverse conditions a number of these have become very successful technicians and capable of rendering a very valuable service. Many were almost a complete failure and sooner or later left for newer pastures. The rank and file may be classified somewhere between the extremes.

As time passes, the older and weaker ranks are thinning out. Others must be selected to fill their places. Many X-ray laboratories are increasing their facilities and raising their standards in order to increase their volume of work. This frequently necessitates more technicians. Many new laboratories are being established from time to time, most of which require the service of one or more technicians. The demand for skillful, well-qualified, and trained technicians has been and will continue to be, for some time to come, beyond the supply. As better judgment is used in the selection of individuals for technical training, a larger number of good technicians will become available. It is the purpose in this paper, to discuss some of the essential qualifications which should be considered when an individual is applying for, or is being considered for a position as an apprentice technician. It is to be understood that the writer is expressing only his own personal opinion as a result of many years of experience in the training of technicians.

[1]Read at the 13th annual Convention and 2nd annual clinical congress of the Catholic Hospital Association, held at Cincinnati, Ohio, June 18-22, 1928.

Limitations of the Technician

The position of the X-ray technician is quite similar, in many respects, to that of the trained nurse. They all work with the patient who is usually suffering, more or less, from disease or injury. They should work only under the direct supervision of a properly qualified radiologist, physician, surgeon, or dentist. They have no moral right to nor can they hope to work, successfully, independent of proper professional supervision. The X-ray technician should never express an opinion or enter into a discussion regarding interpretation, diagnosis, or therapy except it be to his professional supervisor alone. He cannot afford to assume the risk of such a responsibility. He must work in the capacity of an assistant to the profession.

Qualifications of Technicians

The X-ray technician may be either male or female, however, the great majority of those so employed today are females, probably for the same reasons that that great majority of trained nurses are females. A few laboratories will employ only males, a very much larger number only females. Many laboratories employing a number of technicians will employ both males and females. There is, and probably will continue to be, some demand for male technicians, more especially in the larger laboratories.

The age of technicians varies widely but averages from 20 to 40. A few younger than 20 and older than 40 are employed. The age of individuals selected for this work should ordinarily range from 20 to 30 and only those of sound mind and mature judgment should be approved.

The health of the technician is an important consideration. Only healthy individuals and those who appreciate and know how to retain their health should be considered. Careful clean living is always an essential if good health is to be maintained. Cleanliness of person and of working conditions, good ventilation, proper food and outdoor exercise all contribute to better health.

One of the greatest essentials for success in any line of human endeavor is character. A good, clean, sound, moral character is a valuable asset to anyone and should be given careful attention when considering an individual for technical work. Honesty of purpose and intent is a strong indication of character. Will power and self-control play an important part. Home, school, and church training affect character. One's associates are generally an indicator of character. Any material evidence of weakness or lack of character should at once disqualify the applicant regardless of other qualifications. There is always hope for the individual with a strong character, good health, and a willingness to work.

The technician must possess an almost unlimited amount of patience. Kindness, courtesy, tact, and diplomacy should be exercised at all times in the presence of his associates, visitors, and more especially his patients. It should be remembered that the patient is sick, mentally, physically, or both and needs help or assistance.

The patient should be so cared for that if he should have similar work to be done in the future, he would want to come back to you. The action or behavior of the technician may contribute much or little toward the success of a laboratory.

Confidence plays an important part in success. The technician must first have confidence in himself and his work. He must then obtain the confidence of his employers, his associates, and last but not least the confidence of his patients. Without the ability to establish confidence the technician is doomed to failure.

Education of Technicians

The educational requirements of the X-ray technician cover a considerable range of subjects. At least some knowledge regarding physics, chemistry, photography, physiology, anatomy, pathology, nursing, and professional ethics is a necessity.

In order to arrive at a more intelligent conclusion regarding the necessary educational qualifications of an apprentice technician, it is probably wise to consider the results of the past, more or less haphazard, method of selecting applicants.

A high-school, college, or nursing-school education has not been considered a necessity in the past but will undoubtedly receive more consideration in the future. In the light of past experience, only a small percentage of those with only a common-school education have reached the higher positions. A higher percentage of those who have a common-school education plus a high-school education have been successful. Only a very small percentage have entered this field of work, who have a college education, but their percentage of success runs quite high. A considerable number of graduate nurses have entered this field with a very high average of success. Probably the highest average success has been attained by the Sisters of the various Catholic hospitals throughout the country. The reasons for the degree of success of these various groups should be at once apparent. The education and training of the Sisters have provided them with about all the essential qualifications except a knowledge of the equipment. They become intensely interested in the work, develop rapidly, and usually make it their lifework. The degree of success of the graduate nurses ranks next to that of the Sisters. Their education and training has also provided them with most of the essential qualifications for success. Both the Sisters and nurses have been thoroughly trained as to the handling and care of patients as well as in the professional ethics involved. The college and high-school graduates have generally received much of the information required regarding physics, chemistry, photography, physiology, and anatomy, but lack the nurses' training. The common-school graduates, because of the lack of so many of the essential qualifications, require more time for development and not infrequently become discouraged and quit. Unless there is danger of depleting the ranks of the nurses' profession, to too great an extent, it is probably well to encourage their entering this field. There will still be room for others. If it were feasible to require all future applicants to begin by taking all or part of a course in nursing much could be accomplished toward raising the technical standard.

According to the above observations the Sister or the trained nurse has the greater chance and the individual with less than a high-school education the lesser chance of becoming a thoroughly competent technician. Hospitals should have little difficulty in providing their own technicians, as a Sister or graduate nurse can usually be selected and trained, within a reasonable time, in the necessary technical procedure.

With more than 7,000 hospitals now existing in the United States and with probably two or three times as many X-ray laboratories outside of hospitals, a large percentage of which employ one or more technicians for part- or full-time service and with these numbers constantly on the increase it would seem that the proper training of technicians should receive the immediate and most careful consideration of all concerned.

The acceptance of so-called apprentice technicians in X-ray laboratories for a training period of a year or more has resulted in the development of some excellent

technicians but, more frequently, has fallen far short of being satisfactory because of the selection of individuals of limited qualifications or because of lack of time, equipment, personnel, or properly planned courses of procedure. If some of the universities and hospitals which are already conducting nursing schools could add three to six months' intensive training in X-ray technical procedure, properly equipped and conducted, much could be accomplished toward raising the standard of future technicians. A very few schools are already trying out a similar plan with physical-therapy technicians by adding a year's intensive training in physical-therapy technic to the regular course of physical education in the nursing school. The added time for the training of the X-ray technician could be materially lessened from that required for the physical-therapy techinician. In fact, either or both X-ray and physical-therapy courses might be included. If both courses were taken, the technician would qualify himself for a position with the smaller hospital or laboratory where the volume of work done would not justify the employment of two technicians. If a certificate or diploma of some form could be given for such additional work, when completed, it would probably add to the attractiveness for the work and facilitate employment. The time will probably come when courses especially prepared to meet the more exact requirements of the X-ray technician will be available. There is no fixed rate of compensation for the services of the technician. He usually receives compensation in the way of financial remuneration, about in proportion to the importance and value of the service he renders.

Organization of Technicians

In conclusion, every qualified technician should register with the National Board of Registration and then become a member of his local and the national organization, the American Association of Radiological Technicians. While this is not at present compulsory, it may soon become so. The technician owes allegiance to his profession and should provide himself, his employer, and his patients with the protection which registration makes available.

Physical Therapy and Industrial Insurance Work[1]

Charles P. Hutchins, M.D., Ex-President, American Academy of Physical Therapy, Syracuse, N. Y.

The Insurance Factor in Industry

INDUSTRY, while it is composed of ofttimes conflicting interests—the employers and the workers—nevertheless must stand as a whole. The attempt on the part of anyone to foster the one side in industry as against the other would most surely work for the destruction of industry and to the disadvantage of all.

Industry must be understood by the legislature and by the state government generally to be the means of livelihood, direct or indirect, not of stockholders alone, but of a large part of the whole people.

Workmen's compensation may be liberal in legislative provisions or in the interpretation and administration of the law or in both. Provision for care, treatment, and compensation range from a medical benefit of 10 days with a maximum of $150 in one state through periods of 30 days, 60 days, 90 days, 6 months, with maximum sums ranging from $100 to $800 and to eight states with unlimited medical benefits "in accordance with the nature and extent of the injury." In the majority of medical-aid sections, extra periods and amounts are provided by action of the commissions.

Increasing liberality of legislative provisions of workmen's compensation has been augmented in New York State particularly by a growing liberality of administration. This is evident in the referee system which requires the hearing of every case individually and in the generous interpretations for schedule loss awards. A single illustration will suffice. The loss of more than one half the terminal phalanx of any digit is construed in New York State as a loss of one half that digit. The same is true of loss of use.

Six states have monopolistic state-managed insurance; 18 states have no state-managed insurance; 10 have private insurance in which carriers compete with state-managed insurance; 1 semi-monopolistic—conditional private coverage; 5 no compensation law; 17 states provide for the suspension of compensation for refusal on the part of claimants to accept proper treatment.

Satisfactory income is dependent upon stable employment. A vital cause of loss of income to the wage earner is his disablement, either temporary or permanent, through accident or injury in the course of his employment. Stable employment depends on physical ability to compete in the labor market. Compensatory schedule loss awards are an inadequate substitute for reclamation. For example:

A young man, 25, will probably have 40 years of breadwinning ahead of him. We will assume that he will be entitled to the maximum of $20 a week for permanent partial. A loss of use of 50 per cent of a hand amounting to 122 weeks will at $20 realize $2,440. Divide this amount by 40 years and 52 weeks per year and we find that $1.16 a week will represent the indemnification for this handicap. It is all the law provides. See how important physical therapy becomes in this instance, if it is able to reduce his percentage loss to, for instance, 25. This might make a difference between his ability to continue at his task, at the same time that it would cut his award in half.

Reclamation of the Injured

Physical

After trauma in general there is great danger that the delicate adjustments of muscular movement resulting from years of training may be lost through disregard or through ill-conceived after-treatment. The surgeon can but make healing possible. The physical therapist must come to the aid of the surgeon as fully and consistently as roentgenology and laboratory technic. The real cure is the restoration of muscular activity toward which all surgical and physical effort aims.

Economic

The attitude of the individual counts little against the welfare of the family, the health that is so fundamental for the life that has been made useful, and the production of necessities. On the production side, management is vitally interested in every expense of the finished product. The premiums of the workmen's compensation insurance form a part of the cost of operation. Reduce the necessity of compensation benefits and this item is saved to production cost. The entire trend, therefore, is toward conservation. The compensation principle has in large measure brought this to pass and today wise and shrewd management in industry has come to recognize that economy in production cost relating to human machinery is favorably affected by:

[1]Read at the 13th annual Convention and 2nd annual clinical congress of the Catholic Hospital Association, held at Cincinnati, Ohio, June 18-22, 1928.

1. Measures to prevent accident.
2. First aid facilities to prevent infection.
3. Intelligent surgery to conserve structure.
4. Rehabilitation methods to conserve function.

So far as physical therapy and its interpreters are potent in supplementing surgical skill, so far will it—and they—win recognition not only for service to the breadwinning of mankind but for saving to industry in continuity of work and expense of operation; and the saving to industry is expressed in dollars and cents. It shows on the ledger and can be calculated with little or no error by the clerical force. Omit for the time the appeal to humanitarian impulses or arguments. Reduce the problem of restored or improved function to the balance sheet and make physical therapy prove its claim of service to industry—not to the welfare department, but to the executive who must account to the stockholders. Since the indemnities provided by law for disability and loss of use of members fall short of compensating the injured for diminished earning power, it is manifest that the benefit accruing to him from physiotherapeutic accomplishment exceeds the monetary saving by that much.

Social

No association or organization for production can class itself as economic if it fails to deal with the question of loss. Whether the loss be in immediate production, the percentage loss of parts or use of parts of workmen, in acquired skill, in man power, in breadwinning, in morale, from disheartenment in the struggle for life and the life of others, the first function of profit is to balance loss.

The diligent toiler regards the inactivity resulting from his injury as a misfortune to be endured for only such a period as is absolutely necessary for his repair. Whether his solicitude is due to pain, diminished income and forced idleness, or discouragement over his impairment, his eagerness to resume duty is sincere.

So that when the wounds are healed and the surgeon pronounces his services completed, the injured man regards such functional incapacity from pain or permanent stiffness as may remain as totally incompatible with the demands of his trade. The injunction to "go ahead and use it" is not sufficient.

Reciprocal Relations in the Care of the Injured

Since no branch of medical science is omnipotent, we find the most faithful achievements of medicine and surgery in those hospitals that exhibit the broad spirit of correlation of services. The surgical staff with associate cooperation in reclaiming parts ravaged by the mischance of industrial production modulates the damage done.

When surgical expedients have then produced such restoration as opportunity, judgment, and the healing force of nature could accomplish, the ability to use the part, that is the exercise of the neuromuscular mechanism requires special attention. This may be the result of direct trauma to the soft parts or incidental to immobilization or other treatment exigencies. The compensation courts encounter a multitude of cases that have received excellent surgical attention and anatomical repair. There remains definite inability to use the part or to do so produces pain, or there is a loss of muscular power. Without intelligent guidance and ministration, these patients lose heart in the belief that the surgeons dismissal indicates a permanent handicap.

If competent medical hands do not supplement the work of the surgeon, it will be inevitable that some of these will find their way into the hands of peddlers of physical modalities. The reciprocal relation of surgery and physical therapy in traumatic cases is essential in fulfilling the provisions for medical benefits of compensation laws. Physical measures are no more potent than medicinal or surgical and they depend for success upon the same discriminating selection as attends the exhibition of the older branches.

Wages, employment, and living cost largely determine the wage earner's economic status, and of these, wages are of the most direct importance and form the most immediate point of contact between employer and employee. He must work and to the best advantage that he and his may live. I live in a state that, all factors considered, has the most liberal workmen's compensation law in the United States. Each year witnesses added benefits, medical and monetary. The last session of the legislature, for example, accorded the medical examiners of the state commission the privilege of specifying additional treatment and requiring the referee to order it at the expense of the employer. There was further expansion in the recognition of occupational disease hazard, whether the workman was actually engaged in handling specific irritants or whether he was simply in the atmosphere of them.

Physical Therapy Supplementing Surgery

The limitations of physical therapy in industry are not yet defined. Physical modalities are no more a panacea than other remedial agents or measures. Apart from egotism and extravagance the rational employment of heat, light, water, high- and low-potential currents and manipulation perform service not within the sphere of surgery, medicinal agents, or any exploited cult.

The types of structural abnormalities producing physiological inhibition require no detailed cataloging. It will serve the purposes of this discussion to indicate certain general tissues, mechanical and functional impediments to resolution in which physical modalities are proved auxiliaries of surgery.

When the opportunities and claims of physical therapeutics are presented to audiences, the most frequent questions presented in the discussion are: What type of surgical cases require physical therapy and are most responsive to it? And what modalities are used in each? The following table was compiled from a running group of 165 cases: Fractures 65, neurities and neurosis 15, back sprains and strains 8, semilunar dislocations 6, lacerations 9, infections 13, sprains 24, (including sprain fracture and dislocation) paralysis 8, periostitis 5, phlebitis 2, bursitis 2, burns 4, osteomyelitis 4. It is manifestly impossible to specify the particular type of treatment applicable to anyone. All treatment should be based upon the pathological condition and the sequela of the injury proper or the incidental interference. You can with no more propriety prescribe diathermy treatment for a sprain than migrain tablets for a headache. Rational therapeutics calls for individualization as much with physical modalities as with medicinal agents or surgical technic. Clinical experience alone must dictate the proper procedure if the maximum results are to be attained.

The physical therapist is the link between enforced rest and voluntary action. Physical therapy is today accepted. But who is the man that is called physical therapist? With an eye to affluence, medical men in goodly numbers are taking to the title and activity like ducks to water. If it takes more than a wardrobe to make a man, it certainly takes more than a high-frequency machine to make a physical therapist, or a steam sterilizer a surgeon.

Sophistication and presumption are real dangers in the life and progress of this branch of medical science that is potential for so much betterment and such solid value in industrial economy.

The Personnel of a Successful Physical-Therapy Department

Gertrude Beard, R.N., Director of Physical-Therapy Department, Wesley Memorial Hospital, Chicago, Instructor in Physical Therapy, Northwestern University Medical School

THE proper location, a correct plan, and mechanically perfect apparatus, are all necessary and important in establishing a physical-therapy department in a hospital, but all are useless unless the department is administered by efficient personnel.

What constitutes a successful department? Does it mean that the department must be a source of income to the hospital? Does it mean a large proportion of the hospital patients should receive treatment, or that the largest number of patients possible are to be treated by the smallest number of workers at the lowest possible salaries?

The chief aim and purpose of every hospital is to relieve the sick and suffering. If the physical-therapy department assists in this it serves its purpose in carrying out the aim of the hospital. If it can be done so that it is a self-supporting department or a source of income, so much more to its credit. This will depend, of course, on the amount of free work done in the hospital. The physicians and surgeons soon realize this important assistance in obtaining results in the treatment of their patients and send a larger number of their cases for treatment, thus increasing the work of the department and the chances of making it financially a success.

Real success is measured by pleased, satisfied patients, whose time of recovery has been shortened or whose handicap has been lessened by the time spent in the physical-therapy department. The success or failure of the department depends entirely upon its personnel.

All departments of a hospital which deal with treatment or diagnosis of patients should be under direct supervision of the members of the medical profession who compose the staff. So also should the department of physical therapy.

Members of the medical profession are making a study of this science and many have gained a knowledge of its use and the principles necessary for prescribing it. An increasing number of such men are available for the supervision of hospital departments. It remains only to provide some well-trained person to apply the various physical agents in an intelligent manner. The educational requirements and personality necessary for such persons are the objects of this paper.

The Education Necessary

The cases treated in the physical-therapy department of a general hospital are usually of such varying types that a knowledge of all forms of physical therapy is necessary for the person actually administering the treatments. The definition given by the Council on Physical Therapy of the American Medical Association includes, "heat, light, water, electricity (except Roentgen rays and radium) massage, and exercise.

Intelligent use of massage and muscle training is not possible without a thorough knowledge of the circulation of the blood, the anatomy of bones, muscles, and nerves which can be learned thoroughly only by dissection of the cadaver. The physiological effects of heat in all its forms must be understood. Hydrotherapy must be applied with precision and intelligence which can be done only with a knowledge of the physiological effects produced by the application of the various temperatures of water used.

In applying electrical currents, an understanding of the general principles of electricity and considerable knowledge of electrophysics is necessary for the safety of the patient. The physiological reaction on the tissues of the body must be understood. The reasons for the various forms of technic must be known in order to apply intelligently the many forms of electrical current used.

The interesting study of light and its reaction on the human body has attracted many scientists in the last few years. The more research that has been done, the more the scientists realize the dangers of applying various forms of light without an understanding of its effects and the uselessness of its application if not done scientifically.

The diagnosis of a case must convey to the person administering the treatment some definite information to enable him to watch for and report to the physician in charge any undesirable effects or symptoms which may arise indicating a change in the treatment or its discontinuance. The expected results or usual prognosis of the disease should be understood as well as the present existing conditions. All of this requires an undertanding of the fundamentals of physiology and pathology.

Surgical cases are often brought to the physical-therapy department while still requiring extensive dressings which must be removed for treatment. It saves time and the use of space as well as apparatus to have the dressings replaced in the department so a knowledge of and experience in surgical asepsis is essential.

Medical as well as surgical cases require treatment during the acute stage. Skill in arranging and handling the patient while applying the treatment is essential.

Hospital patients may be treated in the room or ward if it is unwise to have them brought to the department. For this as well as for administration of the department, an understanding of and respect for hospital routine is necessary. The continuous contact between the medical profession, hospital authorities, head nurses, and patients necessitates strict observance of professional ethics.

After enumeration of these various necessary qualifications the question arises where may such education be obtained?

Where Obtain Training?

The advance in physical therapy made during the world war called for many persons with training in this profession and as comparatively few were available, courses were started under supervision of the medical department of the Army. Owing to the immediate need, persons with education which gave some preparation for this work were chosen and the greater number of these students were graduates in physical education who had some knowledge of anatomy, massage, and exercise. These were given intensive training in the application of these methods in the treatment of pathological conditions and the theory and application of various forms of electrotherapy and hydrotherapy. And so developed the physiotherapy reconstruction aide of the Army.

Interest was aroused in the profession as the demand for physical therapy increased. Some of these courses started under Army regulations continued under civilian management and other schools which had been offering this training received an increased number of applicants, among whom were graduates and students in phyical education, graduate nurses, undergraduate nurses, and others with no preliminary training. Many new schools were started, some offering scientific, thorough courses with a high standard of entrance re-

quirements, many that did not. This condition in the schools of physical therapy exists at the present time. The courses offered vary from six weeks to two years. The shorter courses specialize in one or more branches of physical therapy. Some are privately owned schools, some are connected with hospitals, some continue under the Army, others under universities and medical schools.

The courses in physical therapy advertised and sponsored by electrical-equipment manufacturers cannot be considered an education in physical therapy. Attempts to practice physical therapy with only this instruction are the cause of many hospital departments with a large amount of expensive equipment standing idle. Most of these courses consist of one or two weeks spent in operation of the type of apparatus manufactured by that particular concern. Physical therapy, as we shall endeavor to show you, consists of far more than the mere application of electrodes.

From the physiotherapy reconstruction aides of the Army, developed an organization of men and women, trained in physical therapy, now known as the American Physiotherapy Association, which has a membership of over four hundred. This association is the only organization of trained people in this country practicing physical therapy under direct supervision of, and in cooperation with, the medical profession. As set forth in their constitution their purpose is, "To form a nation-wide organ which will establish and maintain a professional standard for those engaged in physical therapy. To promote the science of physical therapy by cooperating in the establishment of standardized schools of physical therapy and encouraging scientific research in the profession. To cooperate with or under the direction of the medical profession and to provide a central registry which will make available to the medical profession efficiently trained assistants in physical therapy." The association maintains a free registry for such of its members as are available for positions, under the direction of Miss Grace Courter, Garfield Memorial Hospital, Washington, D. C.

The standards of eligibility for active membership in this association are : "One year's practice within two years of graduation from: (*a*) An approved school of physical therapy; (*b*) an approved course in physical education and an approved course in physical therapy; (*c*) an approved school of nursing and an approved course in physical therapy." The few schools which are on the approved list of this association do not measure up to the standards desired by its members but are the ones now existing which most nearly do so. The executive committee of the American Physiotherapy Association has during the past year prepared an outline, for these schools, of a curriculum which they believe is possible to develop within a few years, with the intention of making this a minimum requirement for approved schools. This curriculum as sent to the schools follows:

Suggested Curriculum

Length of Course: Nine months including 1,200 hours, 33 hours per week.

Entrance Requirements: Graduates of recognized schools of physical education or, graduates of recognized schools of nursing.

Subjects to be taught by members of the medical profession: Anatomy, physiology, surgical observation, orthopedics, pathology.

Major Subjects and number of hours for each:

	Theory Hours	Practice or Laboratory Hours
Anatomy	300 (theory and laboratory)	
Physiology	36	36
Orthopedics	36	36
Muscle Training	36	72
Corrective Exercises	36	72
Massage	18	72
Electrotherapy	18	54
Minor Subjects:		
Pathology	36	0
Surgical Observation	0	36
Principles of Apparatus	6	0
Chemistry	27	54
Physics	27	54
Kinesiology	36	0
Ethics	6	0
Light Therapy	18	27
Hydrotherapy	6	18
Mechanotherapy	0	6
Thermotherapy	1	2
Behaviorism (case work)	18	0

Until courses of greater length are offered which can include instruction in many of the subjects taught nurses in training, the trained nurse undoubtedly has the best background for a position in a hospital department. The surgical asepsis, medical care, professional ethics, and respect for hospital routine necessary are all well grounded. Not all of a nurse's training is essential to, and much more additional education is necessary for, the practice of physical therapy. Nurses, as well as others without even this training, who obtain a few weeks experience given in electrical-equipment manufacturers' display rooms are going into physicians' offices and hospital departments attempting to practice physical therapy. They are making many failures for the profession.

Physical therapy as defined by the American Medical Association Council, may I remind you, includes other measures than electrotherapy, among others massage and exercises, which are today being overlooked and are of utmost importance to the plastic, orthopedic, neurological, and bone and joint surgeons as well as to the physician. The intelligent application of massage and therapeutic exercise requires many hours of study and practice. Hospitals of today are just as unfair to their patients when they permit their physical-therapy treatments to be given by one who has had only a few weeks observation and practical application of electrodes as they would be if they permitted their nursing care to be given by a nurse whose training consisted of a little bedside instruction given by the old family physician.

Must Pay for Work

The department cannot be made a success if too much apparent economy is practiced in the matter of salaries. Nurses who have spent their time and money for this additional education cannot afford to be under greater physical as well as the mental strain of treating many patients one directly following the other throughout the day, even though the hours of employment may be shorter, at the same salary obtained for nursing. Employing poorly trained people at low salaries is not economy in the end.

Especially is it important that the supervisor or the one responsible for the department be well educated in all branches of physical therapy. If the department is a large one, requiring the services of more than one person, it may not be necessary for all to be efficient in every form. Specialists are developed in this profession as well as others. However, as many patients require a combination of more than one of the forms of treatment used, it is advisable and better results can be secured if the personal supervision is followed throughout the treatment rather than have the patient sent from one section of the

department to the other and each treatment given by a different person. This arrangement, however, must vary according to the type of hospital and the type of cases treated.

The personal requirements for success in any profession must include a high sense of honor, a conscientious application to duty and faithfulness and loyalty to superiors. In any contact with the sick or afflicted must be added cheerfulness, unselfishness, sympathy, regard, for the feelings of others, and a desire to be useful and helpful to our fellow men. All professional employees of a hospital must be possessed of dignity, neatness, and promptness. Many cases treated by physical therapy are very slow to show progress and require treatment over a long period of time, therefore, unlimited patience is essential and an understanding of human nature together with the practice of psychology. Never allow patients to become discouraged when from a professional viewpoint the condition is really hopeful. That comprehensive qualification, tact, in dealing with the family and friends as well as the patient is essential. Discretion in meeting economical conditions especially in industrial work is useful. Ability to meet the public impressively and, above all, real interest and a heart in the work are essential. Loyalty to and respect for the medical profession and the chief aim, the relief of the sick, should never be forgotten.

FLOOR PROBLEMS OF THE MODERN HOSPITAL

James H. Longshore

As Dr. Franklin H. Martin of Chicago, director-general of the American College of Surgeons, points out in a talk before the Catholic Hospital Association Convention in Cincinnati, that in this new era of more beautiful hospitals, great care should be taken in locating the hospital on the proper site—not only from the standpoint of beauty but also with the view of being away from traffic noise of automobiles, trucks, and railroads. Rev. C. B. Moulinier, S.J., who has sponsored and labored so hard for the Catholic Hospital Association and in establishing his ideals for the proper environment of both the interior and exterior of the hospital, is fast realizing his ideal in putting the hospital on the highest plane of efficiency and beauty.

The floor problems have gained much attention in the past few years, not only because floors receive the most wear about the hospital, but also from the standpoint of sanitation, as a floor that is not properly treated constitutes a menace in point of sanitation, since it is well known that about 85 per cent of the pathogenic bacteria is on the floor. Sanitation of the floor is readily attainable, and where correct methods are followed, the beauty of the floor and decorative scheme of the hospital are enhanced even at a lower cost than by the obsolete methods of the past. The pores in cement, terrazzo, and similar floor materials are merely placed in which dirt and bacteria lodge; further, by the continuous scrubbing and mopping of floors of this type you are softening or roughening the surface which makes them the more susceptible to the stains of traffic, oils, chemicals, etc., due to the increasing absorbent tendencies, and such stains become more and more difficult to remove.

Perhaps the most popular treatment for wood floors in the past has been varnish. It gives a very beautiful floor, but the expense is quite high; first, because of the time it takes in varnishing; second, because the room cannot be used while varnishing the floor; third, because worn places appear in the doorways, etc., and after a few months' use of the floor the worn places become unsightly. The only adequate way to repair a varnished floor in this condition is the expensive and time-taking procedure of removing all the varnish and refinishing the floor—otherwise, the worn places will always be evident.

Various types of composition, such as magnesite, etc., are very porous and easily become stained; however, when a floor of this kind is properly treated the possibility of becoming spotted and stained has been practically eliminated. A floor of this type should be filled and polished or, in fact, any porous floor should be filled from the standpoint of beauty and sanitation.

Composition floors which have an asphalt base, such as mastic, become easily stained with oils and the like; in fact, a two-color asphalt floor cannot be treated with the customary treatment such as wax, since the oils and greases in the wax are solvents for the asphalt and will cause the colors to "run." A neutral linseed-oil cleaner, preferably in liquid form, is the best cleaner for this type of floor; however, there is a treatment now manufactured which eliminates the daily scrubbing and which will not dissolve the colors but will give the floor a high, hard sheen, at the same time serving as something of a protection against wear.

Rubber floors are becoming more popular in the hospital field but as the natural enemies of rubber are air and oil, great care should be taken in selecting the proper cleaners. Soaps, sweeping compound, floor wax or oil mops should never be used on rubber floors or, in fact, any treatment that is of a greasy or oily nature.

There is a treatment on the market that will give the rubber a high polish and seal it against the air. In the case of worn or porous rubber floors, this product also fills the pores. Some rubber floors are very porous due to their fiber content and after much use and with constant scrubbing the fiber absorbs moisture and leaves an odor. This, of course, can be overcome as pointed out, which is to fill the floor and follow the polishing methods.

Linoleum and cork have long been used as floor coverings in hospitals because of their quietness and resilient nature. Nevertheless, they are both very porous and easily stained. Constant scrubbing causes disintegration of the floor covering, as it does, in fact, almost any type of floor. Great care should be used in selecting a cleaner for floors of this type. The best cleaner is a linseed oil neutral liquid soap.

The usual treatment for linoleum is that of waxing while in the case of cork floors, the prevalent method is washing them with a cleaner as just described.

Marble, faience, or quarry-tile floors are used a great deal in hospitals today, but no matter what type of floor you have, each floor presents its own problems of maintenance. Abrasive or alkaline cleaners should never be used on marble or quarry tile, nor should certain types of oil soap be used, as they will stain the marble. As pointed out, any porous floor should be filled and polished to eliminate the constant scrubbing methods.

Of the various treatments for floors that have been so commonly used, including varnish and floor wax, soaps, and other cleaners, nothing can surpass the beauty of a varnished floor, but as said before, the expense of preparing the floor, the time required to apply varnish and the final lack of durability have made the treatment impractical, if not prohibitive.

Floor wax has long been used as the most practical treatment for most types of floors, but due to its slipperyness and the casualities certain waxes have caused, many have discontinued their use. Floor wax is soft and, in most cases, dirt grinds into it, making it doubly difficult to clean, as the dirty wax has to be removed from the floor.

Ordinary cleaning methods of various kinds have been followed by many hospitals but this process is a constant overhead, as the expense is so much greater than that of a polished floor.

Some two or three years ago a well-known manufacturer of floor treatments placed on the market a floor treatment which combines the best features of varnish and floor wax. The varnish content gives a high, hard sheen to the floor and yet worn places can be repaired without showing overlaps. The finish is harder than floor wax and, therefore, dirt does not become imbedded as in the case of the latter. At the same time, it has that wax quality which causes friction to improve the polish, rather than to destroy it, as in the case of varnish. It also has the advantage of being nonslippery.

In order that it may be used successfully on any type of floor, this product is liquefied with two different solvents, really resulting in two distinct products, one for general use and one for rubber, marble, terrazzo, and the soft composition floors which are soluble in the usual solvents. In the case of the general treatment, it is provided in "natural" or stainless and also in popular colors, in each case combining the qualities of a "filler" and finish in one. Both products are applied with a mop and dry in a very short time; in fact, a floor may be treated and

(Concluded on Page 34a)

The Dietitian's Department

Conducted by Sister Mary Victor, O.S.F., B.S., Dietitian, St. Mary's Hospital, Rochester, Minn.

LIVER IN THE TREATMENT OF ANEMIA[1]

Charlotte Wiedemer, M.D., Ass't. in Medicine, College of Medicine, University of Cincinnati, Cincinnati, Ohio

OF the recent advances in medicine, one of the most spectacular is the rapid improvement made by patients with pernicious anemia who have been given liver, either in their diet or in the form of liver extract.

The term "anemia" is used to denote a decrease in the hemoglobin, which is the red coloring matter of the blood, or in the number of red blood cells, or both. There are two main types of anemia, primary and secondary. Secondary anemia, as the name implies, is the result of some other disease process—infection, cancer, hemorrhage, etc.; and in this type the loss of hemoglobin is usually proportionately greater than the reduction of red cells. In the anemia which follows hemorrhage, there is a loss of both hemoglobin and red cells. The term "primary" anemia is applied to types of anemia for which there is no known cause, the most common one being pernicious anemia. In this disease the decrease in the number of red cells is proportionately greater than the loss of hemoglobin. Until the recent use of liver there was no known cure for pernicious anemia and while the patients would recover from the first few severe attacks the outcome was always fatal. The most important factor in restoring to normal both hemoglobin and red cells is proper diet. Many different kinds of diet have been advocated in both types of anemia.

Experiments With Animals

As frequently happens, the value of liver in the treatment of anemia was first found by experimental work on animals. Drs. Whipple and Robschert began these experiments at the University of California about ten years ago. They bled dogs profusely and repeatedly, thus producing a severe anemia with a loss of both red cells and hemoglobin. They then put these dogs on carefully controlled diets and determined the amount of hemoglobin and red cells produced in a given time by different foods. Aside from the marked results obtained from liver, several other interesting facts were observed. They found, for instance, that dogs which were starved showed a greater increase in hemoglobin and red cells than dogs which were fed on carbohydrates alone. They found also that milk had no effect on the formation of blood, so that in anemic children it is important to give other foods with milk. Of the green vegetables, spinach was the most effective. However, beef, calf, and chicken liver, as well as pork and beef kidney were found to be by far the most potent diet factors in the regeneration of red cells and hemoglobin in dogs with severe anemia, both of short and long duration. Fish liver was almost inert and whole fish caused only a slight regeneration of blood. Next to liver and kidney, beef heart and red muscle meat were the most effective.

Later Dr. Whipple made from fresh liver three extracts, a water extract, an alcoholic extract, and the liver residue. These he gave to dogs with a long-continued secondary anemia and found that each caused a regeneration of red cells and hemoglobin but that each produced only about one third the rise that the fresh liver fed to dogs under similar conditions produced.

The Murphy-Minot Diet

It was on the basis of these experiments that Dr. Murphy and Dr. Minot at Harvard worked out a special diet high in liver for the treatment of patients with pernicious anemia. The daily requirements of this diet are as follows: (1) Liver (calves', beef, chicken) or kidneys (lamb) freshly cooked, at least 120, preferably 200 or more grams (cooked weight). Cook without fat; broil, bake, boil, mince or make into soup. (2) Fruits, preferably fresh, especially peaches, apricots, pineapple, strawberries, oranges, and grapefruit, about 400 grams. Raisins are desirable. (3) Red muscle meat, trimmed free of fat, freshly cooked, 100 grams or more. Beef heart is desirable. (4) Vegetables containing 1 to 10 per cent of carbohydrate, preferably fresh, cooked or raw, not less than 300 grams. Lettuce, spinach, asparagus, cabbage, and tomato are especially desirable. (5) Fats restricted, not over 70 grams. Avoid cheese, bacon, fried food. Allow but little cream and butter and not over one egg. Use mineral oil for salad dressing. (6) Avoid grossly sweet foods yet allow sugar sparingly. (7) Starchy foods, as cereals, potatoes and breads add to suit individual desires but not to the exclusion of the requirements given above. The starchy foods are best crusty or dextrinated; whole wheat toast is desirable. (8) Milk had best be limited to about 240 grams. (9) Avoid excess of salt. Tea and coffee as desired. They further state that ideally, all food should be weighed. The liver is essential and must be weighed at first. After the patient understands the approximate quantity of the different foods to be taken, their amounts may be estimated. When the patient is unable to take most food, it is important that he eat some liver and fruit even if no other food be taken. Then gradually add meat and green vegetables. The starchy foods are to be given in accordance with the amount of the other foods eaten. The patient should be expected to take the full diet within about two weeks after commencing it. Several small meals a day rather than three may be found suitable.

Present information suggests that the patient should continue with this sort of diet even though his red blood-cell count remains high. There is evidence that liver alone is the essential requisite of the diet to increase blood formation. Although ordinary cooked liver is effective, there is evidence that raw liver served after being ground up into pulp is even more effective. If necessary, the liver may be given through a stomach tube. Grossly sweet foods increase an acid fermentation in the large bowel so common in these patients with no hydrochloric acid in the gastric juice. An excess of fat in the diet also causes putrifaction in the intestine.

Dr. Koessler and his associates in Chicago use a diet similar to the Murphy-Minot diet, but include fat in the form of cod-liver oil, butter, and cream, stating that the rate and intensity of blood formation is due to vitamin A.

Drs. Simmonds, Becker, and McCollum at Johns Hopkins attribute the value of both of these diets to the inclusion of vitamin E which is found in vegetable oils, liver fats (not cod-liver oil), rolled oats, polished rice, yellow corn, green kale, and lettuce.

[1]Read at the dietetics clinic of the 13th annual convention and 2nd annual clinical congress of the Catholic Hospital Association, held at Cincinnati, Ohio, June 18-22, 1928.

In a diet which contains such large quantities of food and which the same articles must be repeated daily it is important that the food be as palatable and attractive as possible. With the dietitian, whose duty it is to establish and maintain the patient's appetite as speedily as possible, rests a big responsibility. Many recipes for palatable dishes containing liver are now available, both hot and cold, even to liver ice cream. A day's ration of cooked liver consists of 200 grams (6 ounces). One calves' liver (uncooked) weighs two to three pounds. It will lose about 40 per cent of its weight in preparation. The following table contains suggestions for the preparation of liver in forms from which numerous dishes can be made.

1. Broil slices of calves' or beef liver (do not soak in water first). Steam chicken livers.
2. Remove veins and prepare as one of the following:
   a) Chop in small pieces.
   b) Mince coarsely.
   c) Mince finely and strain.
3. Season with salt and a pinch of sugar. Moisten with gravy from roast meat or broth from broiled meat or fowl.

Additional distinctive seasonings are curry, chop-suey sauce, Worcester sauce, tomato puree with chili sauce, celery salt, onion salt, piccalilli, and sherry.

The following is an example of the Murphy-Minot diet in use at the Cincinnati General Hospital.

Breakfast	Gms.	Purin	Prot.	Fat	Carb.	Calories
Grapefruit	285		2.3	.6	28.8	131.1
Oatmeal	100	.0530	2.8	.5	11.5	63.0
Milk	150		5.0	6.0	7.5	108.0
Sugar	15				15.0	60.0
Liver (beef)	50	.1376	10.2	2.3	.9	64.5
Bread	40		3.7	.5	21.2	107.2
Butter	15		.2	12.8		119.3
Coffee or tea						
Dinner						
Steak	150	.3097	42.3	11.6		277.5
Potato (boiled)	210	.0040	5.3	.3	43.9	203.7
Rice (boiled)	75		2.1	.1	18.3	82.3
Bread	40		3.7	.5	21.2	107.2
Butter	15		.2	12.8		119.3
Spinach	200	.1200	4.2	1.0	6.2	52.0
Applesauce	180		.4	1.4	67.0	282.2
Supper						
Liver (beef)	300	.5594	40.8	9.0	3.4	258.0
Potato (boiled)	130	.0030	3.8	.2	31.4	145.5
Asparagus	200	.0430	3.1	.3	5.6	38.0
Bread Butter	40		3.7	.5	21.2	107.2
Stewed Prunes	10		.2	8.5		79.5
Coffee or tea	160		1.0		36.8	151.0
		1.2207	134.1	68.9	339.9	2516.1

At Harvard such remarkably good results were obtained in cases of pernicious anemia by the use of the Murphy-Minot diet that soon many clinics throughout the country were using it, practically all with the same favorable results. Many cases were reported of patients who had red counts as low as one or two million and after they had been on the liver diet for periods of two to three months showed normal counts of five million red cells. Many of these patients have been observed over a period of two to three years and as long as they continued their diet, have had no relapse. Such results have been impossible by any previous treatment of this disease.

The chief objection to this diet is that it is impossible for some patients to eat large amounts of liver daily over long periods of time. To some the liver becomes so distasteful that the patient loses his appetite for all food. To overcome this Drs. Murphy and Minot, working with a manufacturing company, made a liver extract which contains that portion of the liver which is potent in stimulating blood regeneration. This extract is a non-protein, ether soluble, alcohol precipitable, and water soluble fraction of beef liver and has been found to give the same good results in cases of pernicious anemia as liver in the diet. The extract is a powder put up in small vials. Each vial of the extract is equivalent to 100 grams of liver. It is not disagreeable to take and is usually given in water or orange juice, the amount varying with the severity of the anemia.

Throughout this discussion mention has been made of the liver treatment in pernicious anemia only and it is true that in this disease the most striking results have been seen. However, both the liver diet and liver extract are now being used succesfully in many cases of secondary anemia.

The following cases are brief reports of two patients at the Cincinnati General Hospital who have been treated with liver extract.

Case 1. Pernicious Anemia

A. B., a white male, age 40 years, was admitted to the Cincinnati General Hospital Dec. 5, 1927, with a typical case of pernicious anemia. He complained of extreme weakness, a sore tongue, indigestion, and shortness of breath. These symptoms had begun about four months previous to his admission to the hospital and were gradually becoming more severe. His hemoglobin was 40 per cent and his red cell count 1,310,000. On Dec. 12, liver extract was started; one vial was given with each meal. The patient was on the regular hospital diet and except for some hydrochloric acid, no other medication was given. Two days after the first dose of liver extract, the red blood count began to increase and the patient began to improve. The improvement in his blood and general condition continued steadily and five weeks after he had started liver extract he was discharged from the hospital with a red count of 4,600,000 and hemoglobin 80 per cent. He continued to take small doses of liver, one vial a day, and is now back at work and his red count is 6,000,000.

Case 2. Secondary Anemia

H. H., a nurse at the Cincinnati General Hospital, in October, 1927, began to lose weight and became extremely exhausted at the end of a day's work. Her blood count at that time was normal but she began to take sunlight treatments three times a week to give her more energy. In spite of the heliotherapy, her blood count in the next three months dropped to 3,500,000 cells. She then discontinued the sun treatments and remained in bed for a few weeks rest. On May 25, she began to take 2 vials of liver extract daily. At that time her red count was 4,000,000. In three weeks time, her general condition has greatly improved, she has gained weight, is no longer fatigued, and her red count is now 5,000,000.

The twelfth annual roll call of the American Red Cross will be held November 11-29, 1928.
The Red Cross wishes to enroll five million members for 1929.

Limitation of Practice—What it Means and How it May be Attained[1]

Henry Schmitz, M.D., Mercy Hospital and Loyola University School of Medicine, Chicago, Ill.

THE sole reason for existence of a hospital is the care of the patient which is intrusted to three agencies: the medical, the nursing, and the business or administrative. The hospital therefore assumes many and heavy duties to carry on its sole object. They are partly educational and we are mainly concerned with the educational duties of the medical staff of the modern hospital which, in the end, must culminate in the "limitation of practice."

The training of doctors has become a very important function of the modern hospital. The efforts of the hospital in training doctors have resulted in more progressive and efficient service to the hospital and the patient.

University Hospitals

The hospitals have responded to the needs of the medical profession for clinical teaching, in various ways. A few institutions by affiliating with medical schools have become university hospitals. The clinical facilities offered are an outpatient department and wards to take care of the outpatient when he becomes an inpatient. These teaching facilities are unstintingly placed at the disposal of the medical teachers who are invariably members of the hospital staff and intramural members of the faculty. The medical schools are thus assured of ample facilities for clinical teaching of the undergraduate students. Affiliation of hospitals with medical schools brings to the former certain benefits. The laboratories and the medical and surgical services are of the best because the medical school furnishes the hospital well-organized departments. And university discipline promulgates very productive activities such as research, intense clinical study, and publication of the results attained. Finally the patient is the beneficiary, his care being correspondingly scientific and efficient. That the standard of medical activities in such institutions should be the highest attainable is self-evident. Indeed such hospitals are looked upon as the leaders in modern hospital life.

Teaching Interns and Younger Doctors

Another group of hospitals looks to the medical school to furnish interns. The hospital thus assumes the duty of teaching and training the fifth-year medical student in a rotating service in lieu of the services rendered by the medical students as clinical clerks and assistants in the various hospital services. Quite a number of hospitals offer to well-qualified interns the opportunity for further training in the form of residences or fellowships, to which a remuneration is attached. The teaching and training of these men is a duty of the attending staff. To the degree the staff members discharge these duties will the hospital be assured a regular supply of desirable interns.

Again a modern hospital represents a huge investment in capital. It has therefore a financial or business interest. It must safeguard this investment and obtain financial returns. These can be assured only by a continued supply of staffmen, well trained in the labors and duties of the various medical services. Who should undertake the training? Who will lead on the prospective surgeon, the future internist so they may attain the knowledge and the experience enabling them to enter upon the work and duties of the senior men, when the latter desire or must retire in the evening of their professional life and career? Obviously, the senior staff members have the obligation to rear, develop, and teach the younger men.

A modern hospital can foster its aims only by becoming a teaching institution. It cannot be a one-man hospital any more than a school could be a one-man school.

The hospital cannot ascend and descend in its activities with the ascent and descent of the "one man." Its motto should be *excelsior,* ever upward. A teaching institution must have an organization for the development of and study in the various branches of modern medicine. The organization is composed of departments. Each department should be headed by an outstanding representative.

The Teacher Must Specialize

A successful and ideal teacher should be an altruist. He should be unselfish and consecrate his life to his mater medicinae. He must give, give and again give of his rich experience, from his vast fountain of knowledge collected in the years of observation and study. What are the factors that make a successful teacher that mold into a scientist? Osler expressed them as observation, recording, tabulation, correlation, communication. A teacher should also be a scholar, a student. He must ever enrich his knowledge by reading, travel, attendance at medical meetings, postgraduate study, etc. To such a man the training of students, interns, and younger medical men may be intrusted with the assurance of productive results. Hand in hand with the acquisition and advancement of knowledge will come the desire and the necessity to do one thing well. Sciolism is dangerous.

Traditional individualistic service or private practice is incompatible with the progress of medical sciences and arts. No one living man can be master and expert in the entire domain of medicine. If such a man assumes that he can render the best services to his patients under all conditions he is out of place in modern medicine. He barters with the patient's health to gain a monetary consideration. The interests of the patient are obviously not reflected upon. At a recent meeting in Chicago, William Mayo spoke about the trend of modern medicine toward specialization. He stated: "The general surgeon of the immediate past is fast disappearing. There is really only one surgeon left in Chicago whom I should permit to operate on me for any kind of pathology. Medicine and surgery have become so highly specialized that they are not any more a one-man's job." If one adheres to the highest ideal in medicine, namely that the patient's interest must come first, last, and all the time, then we must support specialization in medicine and give the patient the benefit of modern specialist service.

Specialization Requires Cooperation

Limitation of practice can be attained only by organization and cooperation. These alone will produce the highest efficiency in medical practice. The organization of the medical and surgical services is really a simple matter. It may be evolved as follows: The department of medicine including divisions of general medicine, pediatrics, dermatology, syphylology, neurology; the department of surgery including divisions of general surgery, brain, cord, and nerve surgery; urology; eye, ear, nose, and throat, and orthopedics; the department of gynecology and obstetrics; the department of physical therapy and diag-

[1]Read at the Illinois Conference of the Catholic Hospital Association at Rockford, Ill.

nosis including X-ray diagnosis, radiation therapy, and other physical agencies; the department of laboratories including divisions on routine examinations, blood-chemistry, serology, bacteriology, and pathology. Each department is supervised by a chief or head. The heads constitute the executive staff of the medical staff of the hospital, so proper cohesion between departments may be fostered and maintained.

Each division consists of a senior staff member, an associate staff member, an assistant, an intern, and in university hospitals, three or four additional clinical clerks consisting of senior medical students. The execution of the work in each division comprises daily morning rounds by the entire group, and evening rounds by assistant and intern. There should be a weekly pathological conference for the entire staff, or separately for the three clinical divisions, in which specimens obtained at operation and postmortem examinations and microscopic findings are demonstrated. Postmortem examinations should be attended by all the men in the respective clinical departments. Assistants are permitted to do general practice. Associates must limit general practice to about 20 per cent of their special work. Senior men must limit themselves entirely to their chosen specialty. If a surgical assistant comes in contact with an infectious disease he is requested to refrain from attendance in the operating room and surgical wards.

The assignment of patients to the various departments may be made by the admission office, or the physician sending the patient may designate the assignment. Interdepartmental consultations are rendered free of charge. The bill for professional services is rendered by the department treating the patient. Thus there would be only one charge for medical attendance. The objection to the high cost of specialist's services is thus eliminated.

How Make Staff Appointments

Appointments to the attending staff are made yearly and depend (1) on efficiency of service to the patient; (2) on monthly attendance at the meetings of the staff and of the special societies; (3) on a yearly attendance at a national meeting; (4) on a yearly visit of one month to a clinic; and (5) on a yearly publication of one paper in either laboratory or clinical research. The paper must be read before a medical society and published in a medical journal after censure and with the permission of the chief of the department. The medical school and hospital where the work was done should be given proper credit. An assistant cannot be advanced to an associate staff position unless he has spent at least one year in clinical study and research either abroad or in the States.

The Evils of Selfishness

Organization, cooperation, and specialization cannot succeed if selfishness rules the inner man. Selfishness and ulterior motives in a senior staff man are inexcusable. He sacrifices for an instant gain the richer harvest the future offers. The patient and the hospital are secondary considerations. Again, a young medicus performing a major operation or attending a serious illness is derided by the older men. Should the young men call in older men, the sparrows on the roof will peep the next day the latter's accomplishments. We forget the young doctor must live, he must make a reputation. If a senior staff man must look to a medical neophyte for the enrichment of his coffers he presents a sinister example of greed. Why not meet the young man as he enters upon his medical career with genuine paternal friendship, and if he is deserving make him a copartner in our medical work and give him remuneration appropriate with his services and based on a yearly growing percentage of the combined income. Only thus can the faults and drawbacks of medical practice be corrected and avoided. The true physician leads a life without thought of the world's honors, remunerations, and praises. He leads a zealous, inspiring life.

The reputation of a hospital depends on the degree of efficiency of its service to the patient. The success of an institution grows with the increase in efficiency of all the medical work. As the reputation of an institution increases so the reputation of every staff member will grow. And the growth in medical efficiency will increase the standing of the hospital and in that proportion the financial returns to each member—a just remuneration for the sacrifices they made in introducing limitation of a practice.

GRADUATES AND SENIOR CLASS, MERCY HOSPITAL, ANAMOSA, IOWA

Proper Division of Authority in Hospital Control[1]

N. P. Colwell, M.D., Chicago, Ill., Sec'y., Council on Medical Education and Hospitals

THE discovery of the germ origin of most of the epidemic diseases during the past fifty years has resulted in marvelous developments, not only in medical education and in the practice of medicine, but also in hospitals. The addition to the definite information was so extensive as to require a much more severe course of instruction in medical schools. The methods employed in the treatment of sick and injured people have also become more highly technical than formerly. For example, surgery is now employed in practically every part of the human body, even including the brain and the heart, which were formerly supposed to be such vital parts as to place them beyond the reach of the surgeon. The Roentgen-ray and radium which were not known until the late nineties are now in extensive use in all hospitals. Serums, vaccines, and antitoxins formerly unknown are now commonly employed. Even blood transfusions are being frequently made since aseptic conditions make such methods possible.

It can readily be seen that these methods are extremely valuable when employed by physicians who are well trained and expert in their use, and in hospitals where strictly aseptic conditions can be maintained. Employed by properly trained surgeons, therefore, in our modern, well-conducted hospitals, these methods are of extreme value and are resulting in the saving of thousands of lives. Employed by improperly trained or incompetent individuals, however, or in institutions where aseptic conditions are not maintained, great damage, or unnecessary fatalities can result.

With the increasing use of these modern procedures in medicine, hospitals were greatly increased in both numbers and capacity. Indeed, since 1906, hospitals have increased in numbers from 2,500 to nearly 7,000 and in bed capacity from 160,000 to cover 850,000 beds. Besides this great increase in numbers and size, hospitals have also developed a higher degree of efficiency and some are now rendering a degree of service to patients never before attained.

With the ideal of service in mind, the first essential of every hospital is a staff of physicians who are graduates of modern medical schools, which provide the training of the latest improved methods of diagnosis and treatment of diseases. Next it must have a competent personnel including its superintendent, nurses, orderlies, and other attendants. With a conscientious and qualified personnel in the hospital, there is no doubt that essentials will be promptly provided. Next to a competent personnel comes another essential—teamwork. If all members of the hospital personnel are working harmoniously, the hospital will reach its greatest degree of efficiency.

It is interesting to know, also, that hospitals, conducted under church control are increasing in both numbers and size. Within five years in the United States they have increased from 893 to 1,060; the bed capacity has increased from 78,000 to nearly 110,000 beds, and the average number of patients cared for from 49,046 to 72,813 or nearly 75,000 patients. Of the 1,060 church hospitals in the United States, 615, or over half, are Catholic hospitals, having a total of 80,000 beds and caring for 57,600 patients, on the average.

A question is frequently asked regarding the proper division of control in church hospitals where friction sometimes develops between the Sisters and the physicians on the hospital staff, the correct answer of which recognizes the dual character of the hospital. On the one hand, the hospital is maintained as a hotel for the sick; as such it makes proper provision for board, meals, light, heat, ventilation, as well as kitchen, laundry, etc. In church-maintained hospitals, the control of these matters would naturally rest with the superintendent and Sisters in charge. The strictly professional affairs of the hospital and the authority for the treatment of the patients belongs to the physicians on the staff. In brief, the proper division of control is between the nonprofessional affairs of the hospital, as contrasted with the professional affairs. Inasmuch as the first essential of any hospital is a staff of competent physicians, with them should rest decisions regarding the actual treatment of patients, as well as other essential professional matters, such as the selection of staff members, residents, and interns. The practice of medicine should rest with the physicians. Hospitals have been known to suffer seriously through a failure to recognize this principle.

There should be those in charge of the administration of the professional affairs of the hospital, such as heads of the various departments of medicine, surgery, obstetrics, etc., and possibly still further centralized in the chief of staff. The chief in charge of the professional work should always cooperate with those in charge of the nonprofessional service, in bringing about in the hospital the highest possible degree of efficiency.

[1]Address to a conference of Sister superintendents held at St. Joseph's Hospital, Chicago, Ill., July 2, 1928.

Dr. Colwell is secretary of the council on medical education and hospitals of the American Hospital Association.

Hospital Costs Again

At the Catholic charities convention held in St. Louis during the week of Sept. 17, Rev. Alphonse M. Schwitalla, S.J., dean of the medical school of St. Louis University and president of the Catholic Hospital Association, spoke on "Hospital Organization for Patients of Moderate Means."

Father Schwitalla pointed out that hospital costs per day have greatly advanced of late years, but, on the other hand, the average stay of a patient in the hospital has been greatly shortened.

The average person spends $125 for a stay in a hospital and must visit a hospital once in twelve years. He can provide for this in his budget. Thus, a man with a wife and two children can provide for hospital service by putting aside 81 cents per week.

Father Schwitalla made four suggestions toward solving the problems of hospital care for the middle-class patient:

1. Hospitals can make a more determined effort to reduce their cost in the hope of giving the patient of moderate means the benefit of the savings.

2. More intense health education in the community will effect broader realization of the importance of health problems and will bring about a corresponding readiness to budget for health.

3. Consideration of the general economic situation must be included in plans for any program of the reduction of costs to the patient of moderate means.

4. A system of health insurance without any form of contract involving the hospital, the medical profession, or the nursing profession, but solely an agreement between an individual and the insurance company could be adopted.

In closing his address, Father Schwitalla made an appeal for higher idealism among members of the hospital staff. "In the development of such ideals," he said, "our Catholic hospitals should find themselves in an enviable position. Theirs is the idealism which seeks not for themselves; theirs is the inspiration that lies in the heart of Him who said: 'Whatsoever you have done to the least one of these, my brethren, that you have done to me.'"

Occupational Therapy with the Ex-Service Man[1]

Eunice M. Cates, Occupational Director, U. S. Veterans' Hospital, Aspinwall, Pa.

THE occupational therapist in a tuberculosis hospital finds herself in a position not unlike that of the little country schoolmarm who said she had seventeen children on her roll and seventeen grades to teach.

If there are 100 men enrolled for occupational therapy, there are 100 "grades" to reckon with; 100 different temperaments, tastes, and stages of physical and mental disability. The occupational therapist should never lose sight of the fact that she is dealing with human personalities having thoughts and feelings like unto her own. They have had their day of being dealt with en masse—these boys who came from the "hillside and the plain" in response to their country's call for men. The ignorant foreigner, the illiterate native white, the negro, the common-school graduate, and the college man marched side by side in those days of '17.

Tuberculosis, like the God of War, is no respecter of persons, a fact easily realized every day by the personnel who "carry on" in Veterans' Bureau hospitals. It is a deplorable fact, but still it is a fact, that more than 7,000 men are being cared for in these hospitals today, victims of tuberculosis, many of them, as a result—either directly or indirectly—of the late war. A large percentage of these have other disabilities, and have been in and out—mostly *in*—hospitals for the past seven, eight, or nine years.

Is it any wonder that they are ill-tempered and find fault, that their outlook on life in distorted? We place them now in a category labeled "old chronics," and it is with these that the occupational therapist has certain problems which do not arise with any other type of patient.

Occupational therapy is an old story to them. Some of them come with an antagonistic attitude. "I didn't come here to work, I came to chase the cure," they tell you. Others plead for "something to do," no matter what, to pass the time away; others know very definitely what they want to do, and demand it. So the aide must be constantly on the alert to find a point of contact and get those who are not interested in work, and watch those who are interested to see that they do not overwork. It is only with the closest cooperation with the ward surgeon that real therapeutic results may be accomplished.

All tuberculous patients are temperamental. There are times when there is nothing an aide can do but "serenely fold her hands and wait," difficult though it may be. She must have poise and infinite patience, above all things. They are impatient. They want what they want when they want it. Like children, too, they are imitators, and it behooves the aide always to have a storeroom well stocked with all kinds of materials, for she never knows what craft will suddenly spring into popularity. Hence, her frequent and seemingly unreasonable requisitions for equipment and supplies. These patients are extremely critical and particular where materials are concerned. Unlike the N. P. patient, who is given activity for activity's sake, the T. B. sees the finished project and works to that end. They are sometimes unreasonable in their demands in this respect, and the aide must summon all the tact and diplomacy at her command to meet the situation.

A little digression here, for I wish to go on record as saying that I would rather see on the staff of any hospital an aide who is well versed in the laws of psychology and pedagogy, with a sunny disposition and an understanding attitude, with limited training in arts and crafts, than one who is a graduate of a dozen art schools, who is tactless and not adaptable to hospital life. After all, this is but an elaboration of the expression given to us by the late Dr. Herbert Hall—"In the rating of an occupational aide, personality should count 80 per cent." The former will succeed, while the latter will not only fail, herself, but counteract the good morale of her associates and coworkers.

All who have given the subject thought agree that mental rest and freedom from worry are synonymous with occupational therapy. A cheerful atmosphere in a workshop is far more important than the making of a perfect project. Craft work primarily should be diversional rather than vocational. It is true, however, that a number of these boys have become very proficient in some particular craft. Happy are they and happy is the aide who works with them. Her only problem here is to curb the desire for commercial gain.

A few weeks ago in our workshop we were having a friendly discussion on the subject of occupational therapy and its value in our particular hospital. The afternoon rest hour was just over and the shop was comfortably filled with workers. One boy was painting a mural decoration—an understanding commanding officer having given his permission at the risk of defacing government property—another was happily engaged in working out a toy from *Popular Mechanics*. Some were making baskets, others tooling leather, each doing the thing he liked best to do. Many interesting things were said worthy of recording. Afterward, at my request, several gave me their opinions in writing.

After an elaborate dissertation on the ill effects of card playing in the wards and the reading of obscene literature, one gives the following reasons for "carrying on" the projects in occupational therapy in preference to other "so-called recreational activities of the institution."

1. "Occupational therapy is constructive. It opens the way to the satisfaction of desires toward accomplishment, a means of indulging a creative hobby.

2. "It is instructive in that it requires some application to principles involved, methods, ways, and means.

3. "It is individual. No restriction, save that of finance, curbs the imagination or the accomplishment of purpose.

4. "It is restful. Freedom from the disease-ladened influence of ward restrictions; the clean, well-lighted, well-ventilated workrooms; the congenial contacts; the wholesomeness of the individual efforts; the absence of negative reactions; mental and physical entirely in accord and at ease.

5. "It is creative. No project is deemed unworthy. The imagination is allowed full sway. Each patient is his own designer and engineer, each his own master and slave.

6. "It is better than medicine. The patient realizes in his work that he is physically able to do something. He is free to think his own thoughts without the constant bugaboo, 'Don't do this' or 'Don't do that' ringing in his ears. There is no deterring 'scientific' reason to harrass his mentality. He is free, his mind is at rest, his body reacts to the restful atmosphere, his soul is made anew. He is a new man. Disease means little to a man who is out of contact with visible evidence of it. Occupational

[1]Read at the annual meeting of the American Occupational Therapy Association held in connection with the annual conference of the American Hospital Association at Minneapolis, Minn., Oct. 10-12, 1927. Released and publication authorized by the Association.

therapy has nothing that is negative to a cure, all that is beneficial."

Another, with characteristic humor, penned the following:

"When I was a lad, a long time ago, I harbored fond de'usions; but time and science have sadly changed many of my conclusions. Time was when I surely thought that driving nails was merely a job, and weaving a rug a tiresome task, not worth a tear or a sob. Surely, I thought, a basket when woven is merely a basket, that's all; and a little wood dog with a coat of paint in curative value is small. And, too, I thought—the more fool I—a piece of leather was part of a bull, which you tooled, laced, and made a bag; and a ball of wool made something you wore, maybe a sweater or maybe a hat or other things a score. I failed to see, in my foolish way, great virtue in a homemade chest; and even now it's hard to enthuse over lampshades and the rest.

"But it seems that I was sorely wrong now the theorists are in sway, for I hammer my nails in a clinic now, not more than an hour a day. Occupational therapy! For that's the blooming name that the scientists gave to the lowly chores that used to seem so tame. And the sweater I wove in the old, old days, which was merely a sweater before, is a nostrum now for my aches and pains, and the job's a job no more. And I chase the bugs by weaving rugs, and our old friend, Tuberculosis, I'm chasing out with little wood dogs, in homeopathic doses. Or, so the scientists tell me in their autocratic way, and I have no words in prose or verse that dare to say them nay. Ologies and Isms surely are mainly their stock in trade; but they have taught me the germicidal value of the cute little things I made. I have listened to their theories, morning, noon, and night; but the funny part is, I've just found out that the darn old theories are right. So I'll hammer my nails and weave my rugs, and play the occupational-therapy game, for the darned old science is chasing my bugs, in spite of its awful name!"

COOPERATION AND ENTHUSIASM

H. H. P., M.D., Member of Staff of St. Bernard's Hospital, Jonesboro, Ark.

IT seems to me that cooperation, unity, or the collective action of persons for their common benefit, or for the common benefit of society, should be a common meeting ground for us. You Sisters, doctors, nurses, the maintenance staff, are banded together to function as a unit toward relieving the sick and the suffering. It is necessary for the building of any worth-while project, for the accomplishment of any great purpose, or the doing of any great good, to have perfect harmony in such an organization as yours; to forget oneself and make oneself the part of a symmetrical structure, keeping eternally in mind the common purpose toward which you all work.

In this hospital you are known as the staff. I am not going to confine my very brief remarks to the medical staff, but broaden them to take in the general staff as presided over by the Mother Superior, for if this institution of mercy and if this great and magnificent hospital, which has been builded by the very things about which I shall talk, is to serve its purpose, there must be cooperation from every department, there must be a perfect blending, there must be perfect harmony.

Seeing Things As a Whole

Mighty guns cannot be gauged by one standing close to them. The grandeur, height, beauty, and symmetry of great mountains cannot be gauged by one standing at the foot of a peak, but he must have a broader horizon, he must look into the entire panorama, he must forget the little things, the broken branches, the dead trees, the upturned roots, which he can see from a closer view, but which, when viewed from afar off, blend perfectly into the magnificent spectacle which thrills by its very beauty. So, as members of this staff, you must forget the little petty discouragements, faults of your brethren, and look upon them for the good there is in them; look at the benefits to society, without regard to color or religion, the humble or the mighty, the kind or the unkind.

The forming of cliques among the staff, the nurses, and even the Sisters, is to be condemned. These combinations attempting to control, as they might, the officers and directors of the hospital, will breed dissatisfaction and discontent among the minor members of the staff, among the nurses in the school, among even the Sisters, with their love and devotion. Therefore, if this great institution, with its staff in general, is to function as a common unit it must have harmony, love, cooperation. You must remember the time-worn phrase "In unity there is strength." Divided forces accomplish nothing. Our forefathers who conceived this nation, who made it possible for us today to enjoy the benefits of good hospitals, of beautiful homes, of the systematic, free, and untrammeled government, saw the need of a close unity and of close cooperation, and taking the place of a few straggling, struggling colonies, and, held together by the warm ties of love and devotion that should bind us, there arose from the dust of the mightiest revolution known to mankind, the greatest free republic under the shining sun. The analogy, I admit, is far-fetched, yet you, in your sphere, doctors, nurses, Sisters, maintenance staff, all, must serve a common purpose; you, each one of you, connected with the hospital in any way, is a host or hostess to the suffering brought to your doors. By ever advancing efficiency, by a greater pride and a greater realization of responsibility in your work, you must assume these burdens.

Dignity and Personality

Nurses by the hundred may be conscientious, ever mindful of duty, dignified, yet one with less regard for her responsibility, with a less dignified, a less courteous air, with less solicitude for her patients, may destroy the entire morale of these hundred nurses. To be dignified, just as a pose, however, is to defeat the reason of dignity, for dignity must accompany personality in a man or woman who has deserved well of life. Not to hold dignity as a great asset is to belittle one's personality and cast a shadow upon worth. He or she who feels responsibility is always accompanied by a splendid dignity. Dignity, and this is especially true of your undergraduate nurses, is not to be confused with an attitude that shuns work with the hands, or that of a menial character—dignity is character itself.

Broadcasting Mistakes

You think the city of Jonesboro and its geographic surroundings are not familiar with your work, possibly. You think your inattention to some particularly insignificant case may go unnoticed. This applies to doctors more particularly than to the nurses Yet there is not a single indiscretion, I venture to say, committed in this hospital by the doctors unknown to and unnoticed by the laity.

People are always ready and willing to criticize the man who practices medicine, regardless of conscientious effort. This may be because of the lack of understanding of the necessities attending the practice of medicine. Medicine is not an exact science. It cannot be mathematically figured in dollars and cents, in arms and legs, or in throats and ears, as some may think. It must be the result of experiment, experience, and scientific research.

In order to attain this, there must be close cooperation. There must be an exchange of ideas by the doctors themselves, it seems to me, between the doctors and the laboratories, between the doctors and the nurses, in short, there must be that perfect harmony and that perfect unity which I have mentioned. The practice of medicine is neither a perfect nor a stationary science. Twenty-three centuries and more of medicine have preceded yours. Yet, not a single one of its departments has yet reached scientific exactness, nor probably ever will. "Science moves but slowly, creeping on from point to point."

Be Progressive

Science is organized knowledge, and if anyone doubts the rapid progress of medical science, or rather the cycle of sciences on which it is founded, tell him to turn to the medical works of one hundred years ago and then to the standard works of today, and behold for himself. Hence postgraduate work, extensive experiments and, above all, stressed in this paper until it may sound like reiteration, close harmony.

You cannot adopt any narrow or foolish dogma or exclusive system and close your mind against all other

ascertained truths. Your one-sided partisanship will fetter you, abridge your usefulness, and make you unfit for fellowship in regular medicine.

Qualities of the Nurse

"We sow thoughts, we reap actions; we sow actions, we reap results; we sow results, we reap destiny." This nursing school will be the making or the breaking of the nurses who leave its portals. It is what you shall all make it. You came to it with a good heritage. If cleanliness, virtue, willingness to assume responsibility, honor, dignity, efficiency, love of occupation, are to be blended in you, you must give in return. You must sow your thoughts, your actions, in later life to reap the benefit of this teaching. For the doctors to have a well-rounded nursing staff, to have graduate nurses of whom this institution shall be proud, it will be necessary to sow these ideals.

Above all things the world despises a pessimist—the man who wears both suspenders and a belt to hold up his trousers. I like to be enthusiastic about the success of any institution with which I am closely connected. I like to think of the future, and not in terms of financial gain. Certainly all of us expect fair remuneration for our honest endeavors, yet I like to dream of what the future will bring of good and of beauty from our collective efforts. Working together, might we not have some day the finest hospital in the Southland? Might we not some day point with pride to St. Bernard's Hospital and say that, "I was a part of the organization which helped build that institution to its present eminence?" Might I not say that by my very action, by my very thought, I helped bind together a dignified unit, an efficient, concertive, harmonious unit, capable of doing great things, one that has done great things, an institution of mercy, of which, justly, we may all be proud?

Keep Lofty Aims

We who today are operating time's treadmill must eventually, in the natural sequence of God's divine plan, give way to those who follow us. May it be your constant aim to make easier the path, to lend every aid possible to the advancement of these mutual aims and aspirations of yours. They are lofty, high, idealistic, worthy of the very best there is in you. Let us live the life, do the acts, think the thoughts, that will congeal and make a perfect system of efficiency that can produce but one result, a greater staff and a greater hospital.

An Analysis of the "Heart Deaths" in a Series of 1,192 Autopsies in a General Hospital*

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The term "heart deaths" has been employed to signify that group of autopsies in which the cardiac lesions were considered as primarily responsible for death. We wish to point out clearly that this paper is not in any sense a discussion of the incidence of heart lesions in a series of autopsies. Instead, it is a review of that group of cases in which death was due to heart disease; there is no attempt to tabulate the occurrence of cardiac lesions in the entire series.

The presentation is based on the pathologic-anatomical changes. An attempt is made to indicate the etiologic factor. This was possible in the relatively few instances where definite bacteriologic or seriologic findings were obtained. In the great majority, the only data were those offered by the past medical history. And in some instances nothing suggestive of a causative factor was available.

The paper consists of an analysis of all the heart deaths in a series of 1,192 autopsies, from 1910 to 1926, inclusive, a period of 17 years. The total number of cases classified as heart deaths is 104. This number may seem small; however, it indicates that about 10 per cent of this series were examples of death primarily due to heart lesions.

The cases analyzed tend to fall into one of the following groups, which will be considered separately: I. Pericarditis, II. Endocarditis, III. Pancarditis, IV. Myocardial degeneration (postoperative), V. Chronic interstitial myocarditis, VI. Coronary occlusion, VII. Aneurysms of heart, VIII. Heart, kidney, and arterial disease with failure, IX. Gumma of heart, X. Miscellaneous, XI. Anomalies of heart.

I. Acute Pericarditis

This group includes the cases in which an acute pericarditis was considered at autopsy as the lesion leading to death. It does not include terminal pericarditis associated with chronic nephritis, gout, diabetes, etc. That found as a part of pancarditis is, of course, listed under pancarditis. No diagnoses are listed under more than one heading. Tuberculous pericarditis is placed in this group, when it was the outstanding lesion; that occurring in generalized miliary tuberculosis is not included in the series, it not being a type of heart lesion leading to heart death, but merely an incident in a generalized tuberculous infection.

Number of cases	5
Average age	49 years
Sex	
Male	5
Female	0
Cause	
Tuberculosis	2
Acute infections	3
(Associated with pleurisy, pyonephrosis and pneumopericardium, respectively.)	

In dealing with the pericardium it may be noted that there were 5 cases of haemopericardium with sudden death, following ruptured aortic aneurysms. These are discussed below, in dealing with chronic aortic valve lesions and their relation to syphilis and aneurysm.

II. Endocarditis

The general term "endocarditis" includes all cases showing valvular lesions which were directly responsible for death. The subdivisions of this group explain the nature of the lesions, and the causative agent is given when possible. The term "rheumatic" is applied to those cases in which there was a history of rheumatic fever with definite joint involvement and elevation of temperature. Cases of chorea are also included under this heading. It was quite hard at times to tell whether a case should fall into the rheumatic group, due to the absence of a history or to the difficulty of interpretation of the history available. In the instances where the history was not clear-cut, the acute verrucose lesions were classed as rheumatic. And again, where the history of acute rheumatic fever was definite, the lesions were classed as rheumatic, even though they appeared more or less like the vegetations typical of subacute bacterial endocarditis. We may subdivide endocarditis as follows:

A. Acute Endocarditis

This includes all forms of true acute endocarditis, whether verrucose, vegetative, or malignant; the latter term, of course, connotes ulceration of valve leaflets.

Number of cases	9
Average age	34 years
Sex	
Male	7
Female	2
Cause	
Rheumatic	3
Pneumococcic	2
(One with perforation of aortic valve)	
Gonococcic	2
(One with perforation of aortic valve)	
Undetermined	2
Valves involved	
Mitral	3
Rheumatic	2
Pneumococcic	1
Aortic	3
One without perforation (cause?)	
Two with perforation	
(Gonococcic 1)	
(Pneumococcic 1)	
Mitral and aortic	2
(Gonococcic 1)	
(Cause? 1)	
Mitral and tricuspid	1
(Rheumatic)	

From this, one sees that the mitral and aortic valves were most commonly involved and that the cause varied. It is of interest that the greatest single number of cases in this acute group were "rheumatic" in origin.

*Presented before the cardiac commission, Allegheny County Medical Society, at Mercy Hospital, Pittsburgh, Pa., Mar. 2, 1927.

B. Subacute Bacterial Endocarditis

In determining which cases came under the above heading, a difficulty was encountered at once, since there was no uniformity in the pathologic findings recorded. The clinical history was found to be the only reliable guide, as the clinical manifestations of the disease are generally recognized as distinctive. The following table shows the variations in the valvular lesions, which ranged from typical vegetative to malignant forms; often, in either case, with a previous fibrosis of the valve. Hence, on a simple morphologic basis, this group could have been distributed between the preceding and following groups, for in our series, at least, subacute bacterial endocarditis did not prove to be a distinct pathologic entity.

Number of cases	6
Average age	38 years
Sex	
Male	2
Female	4
Cause	
Rheumatic	3
Undetermined	3
Valves involved and nature of lesion	
Vegetative Mitral	1
Vegetative mitral and aortic	2
Vegetative mitral and malignant aortic	3

It is interesting that a history of acute rheumatic fever was recorded in one half of the cases. This bears out the work of Clawson and Bell,[1, 2] who found that subacute bacterial endocarditis was sometimes preceded by a rheumatic infection.

C. Chronic and Recurrent Endocarditis

This includes chronic with recurrent verrucose or vegetative endocarditis, but not malignant endocarditis. It indicates the presence of a terminal acute lesion superimposed on a definitely sclerosed valve, which latter was of long standing and was responsible for the events leading to heart failure.

Number of cases	9
Average age	42 years
Sex	
Male	7
Female	2
Cause	
Rheumatic	4
Syphilitic	1
Undetermined	4
Valves involved	
Mitral	2
Aortic	2
Mitral and aortic	3
Mitral, tricuspid, and aortic	1
Mitral, tricuspid, aortic, and pulmonary	1

As noted in the two preceding types of endocarditis, here again we see that the valves usually involved were the mitral and aortic and that they were related to chorea and rheumatic fever in nearly all instances where the cause could be ascertained. We feel that some of the cases of undetermined origin would undoubtedly fall into the rheumatic group if the information available were more complete. Further, a distinction between this and the subacute bacterial group was often difficult to make. The arrangement given here was adopted after consideration of all available clinical and pathological data. This group is to be considered essentially a rheumatic one, of chronic and recurrent type, with death in the last acute attack.

D. Chronic Endocarditis

This term designates a chronic sclerotic valvular lesion as the outstanding entity, and the importance of the lesions was borne out by the fact that these cases terminated in cardiac failure.

Number of cases	17
Average age	40 years
Sex	
Male	13
Female	4
Cause	
Rheumatic	3
Syphilitic	4
(Three with aortitis)	
Undetermined	10
Valves involved and cause	
Mitral	5
Rheumatic	1
Undetermined	4
Aortic	7
Syphilitic	3
(With aortitis)	
Undetermined	4
(One case showed perforation of cusp with sudden death.)	
Mitral and aortic	3
Rheumatic	1
Syphilitic (?)	1
(No aortitis)	
Undetermined	1
Mitral and tricuspid	2
Rheumatic	1
Undetermined	1

An interesting feature of this group is that the aortic valve was involved in the majority of cases, the lesion being single in 7 instances and combined with mitral disease in 3. Of the 7 cases given, 4 were definitely syphilitic in nature, 3 having an associated syphilitic mesaortitis. Longcope[3] in 1910 found that in a series of 22 cases of aortic insufficiency in which only the aortic valve was involved, 81.5 per cent showed also syphilitic mesaortitis. Cummer and Dexter[4] in 1912 reported 36 cases of aortic disease, 27 of which gave positive Wassermann tests. These authors concluded that 70 to 75 per cent of the lesions of the aortic valve are syphilitic in origin. Scott,[5] in 1924 reported a series of 25 cases of aortic insufficiency, all of which showed syphilitic mesaortitis.

From our findings in the present series of cases of chronic aortic endocarditis where the cause is established, it appears that 50 per cent or more of them are on a syphilitic basis, this assumption being made from a study of the serologic findings and the nature of the lesion, both macroscopically and microscopically. It is true, however, that not all cases of syphilitic aortitis show involvement of the aortic valve. This is well illustrated by the nine instances of syphilitic aortic aneurysm in this series of autopsies, in not one of which was there gross or microscopic involvement of the aortic valve.

Aortic Aneurysms

Number of cases	11
Average age	46 years
Sex	
Male	10
Female	1
Cause	
Syphilitic	9
(Aortitis) (Valve clear)	
Mycotic (?)	1
(No aortitis) (Valve clear)	
Undetermined	1
(No aortitis) (Valve involved)	
Termination of aneurysm	
Aneurysm with sudden death	2
Aneurysm with rupture into pericardium	5
Aneurysm with rupture into trachea	1
Aneurysm with rupture into bronchus	1
Aneurysm with rupture into oesophagus	1
Aneurysm with rupture into pleural cavity	1

Summary of All Cases of Endocarditis

Total number of cases	41
Average Age	39 years
Sex	
Male	29
Female	12
Cause	
Rheumatic	13 (31%)
Syphilitic	5 (12%)
Pneumococcic	2 (4.8%)
Gonococcic	2 (4.8%)
Undetermined	19 (46%)
Valves involved	
Mitral	11
Aortic	12
Mitral and aortic	13
Mitral and tricuspid	3
Mitral, tricuspid, and aortic	1
Mitral, tricuspid, aortic, and pulmonary	1

From the foregoing it is readily seen that the majority of cases of endocarditis were rheumatic in origin, while a smaller percentage were upon a syphilitic basis. As mentioned before, the number of cases of undetermined origin is too high, although it must be granted that in many instances the exact nature of the etiological factor is very obscure, especially in the later stages of cardiac disease.

III. Pancarditis

This group comprises those cases in which the pericardium, endocardium, and myocardium were involved, eventually leading to failure. They may be designated as being either acute, chronic and recurrent, or chronic.

A. Acute Pancarditis

This heading includes those cases which develop suddenly and lead to a rapid termination.

Number of cases	2
Average age	19 years
(One 8 years, the other 31 years)	
Sex	
Male	0
Female	2
Cause	
Rheumatic	2

B. Chronic and Recurrent Pancarditis

Consists of cases of chronic pancarditis with an acute lesion superimposed upon it, usually a valvular one.

Number of cases	5
Average age	26 years
Sex	
Male	5
Female	0
Cause	
Rheumatic	5

C. Chronic Pancarditis

Includes cases of pancarditis of rather long standing, eventually leading to failure.

Number of cases	1

Average age	43 years
Sex	
Male	1
Female	0
Cause	
Rheumatic	1

Summary of All Cases of Pancarditis

Total number of cases	8
Average age	26 years
Sex	
Male	6
Female	2
Cause	
Rheumatic	8

This group forms an interesting and important one, inasmuch as all of the cases are upon a "rheumatic" basis and the age incidence is early. It illustrates the most severe type of heart involvement, that associated with rheumatic fever. In this group, at least, the history of acute rheumatic fever was definite in all instances.

IV. Myocardial Degeneration (Postoperative)

This group is intended to include only those cases which developed an acute failure following a major operation. The onset of the failure in most instances occurred from 1 to 7 days after operation. The so-called acute toxic myocarditis associated with acute infections, septicaemia, pyaemia, etc., is not included. In fact, this latter diagnosis did not appear as the primary cause of death in any autopsy in the series.

Number of cases	8
Average age	42 years
Sex	
Male	4
Female	4
Type of operation	
Laparotomy	6
Fibromyoma	2
Cholecystitis	1
Peptic ulcer	1
Peritoneal adhesions	1
Chronic intestinal obstruction	1
Osteotomy	2
Resection of head of femur	1
Excision of knee	1

The exact nature of the lesion is hard to define. Many of these cases came to autopsy as suspected embolism to brain or lung, but the only lesion found was that of myocardial degeneration, i.e., a soft, flabby heart with microscopic evidence of myocardial degeneration of some degree. Aside from this there was no uniformity in the findings, four hearts being hypertrophied, five dilated, and the others apparently normal or even smaller than normal, as indicated by weight.

V. Chronic Interstitial Myocarditis

This represents a group of cases in which there was no demonstrable valvular lesion, though definite fibrotic patches were present in the myocardium. Associated with this was found the clinical pathological picture of heart failure. It is interesting that there are only three instances of fibrosis of myocardium as the outstanding cardiac lesion. Myocardial fibrosis occurred, as listed elsewhere, with many other cardiac lesions, particularly in the pancarditis group; in the present small group it appeared as the principal lesion.

Number of cases	3
Average age	36 years
Sex	
Male	1
Female	2
Cause	
Rheumatic	1
Undetermined	2

This is a type of lesion in which syphilis should be investigated; but study of the myocardium for the spirochaeta pallida was not done in these cases.

VI. Coronary Occlusion

Includes those cases of coronary disease due to septic embolism, or to thrombosis or sclerosis as part of a generalized A. S., either with or without infarction, and with or without aneurysm of heart, usually leading to sudden death.

Number of cases	10
Average age	59 years
Age by decades	
30-40 years	1
40-50 years	1
50-60 years	3
60-75 years	5
Nature of occlusion	
I. A. S. with sudden death	3
A. S. with infarct	4
A. S. with infarct and aneurysm	1
A. S. with infarct, aneurysm, and rupture	1
II. Coronary embolism and infarction (Acute verrucose aortic endocarditis.)	1

In our series, the cases of coronary occlusion occurred usually in the fifth, sixth, and seventh decades and most of them were associated with advanced arteriosclerosis. The majority of this number were males, in a ratio of 4:1.

From the analysis of the above cases, it is evident that this group illustrates five types of fatal coronary disease.

(1) From arteriosclerosis of coronaries with occlusion and sudden death (without infarction).
(2) From arteriosclerosis with occlusion, infarction, and sudden death.
(3) From arteriosclerosis with occlusion, infarction, Aneurysm, and sudden death.
(4) Arteriosclerosis with occlusion, infarction, aneurysm, rupture of aneurysm, and sudden death.
(5) Septic embolism with infarction and sudden death.

VII. Aneurysms of Heart

This includes one case of mycotic aneurysm of the sinus of Valsalva with rupture into the right auricle, and two cases of aneurysm of the left ventricle, one with infarction, and another with infarction and rupture. The latter two followed coronary occlusion, and are also included under that group.

Number of cases	3
Average age	49 years
Sex	
Male	2
Female	1
Site	
Aneurysm of sinus of Valsalva with rupture into right auricle	1
Aneurysm of left ventricle	2
I. Following coronary occlusion with infarct	1
II. Following coronary occlusion with infarct, aneurysm and rupture	1

VIII. Heart, Kidney, and Arterial Disease With Cardiac Failure

In this group, the number of cardiac lesions was considerable; but their exact degrees of importance in causing death in the individual cases were difficult to determine. It seemed better to include the entire group, than to omit it altogether.

Under the headings of Heart, Kidney, and Arterial Diseases, are placed those cases in which there was generalized arteriosclerosis, including the renal vessels, hypertension, cardiac hypertrophy, and ultimately the picture of heart failure. We wish to make it clear that no cases of renal hypertension have been included. These were eliminated by careful study of the clinical and anatomical findings.

Number of cases	18
Average age	63 years
Age by decades	
40-50 years	1
50-60 years	3
60-70 years	10
70-80 years	4
Sex	
Male	11
Female	7

In this group of cases, the outstanding thing is that most of them occurred after the fifth decade, the majority being between 60 and 70 years.

IX. Gumma of Heart

Only two cases were found in this series. Both involved the interventricular septum and gave the clinical picture of Stokes-Adams syndrome. The subjects were males, one aged 38 years, the other 50 years.

X. Miscellaneous

Under this heading are included two rare cases of cardiac disease. The first was diagnosed as acute dilatation of the right heart and at autopsy showed marked dilatation of the right auricle and right ventricle. The patient was a male, aged 38 years, and the cause was unknown. This is the only case in the series in which the diagnosis of acute dilatation of the right heart headed the protocol.

The second case was a peculiar one, in which there was hypertrophy of the right heart with an associated intimal sclerosis of the pulmonary artery. This was a female, 39 years of age. Due to the presence of a localized cirrhosis of the liver, the process in the pulmonary artery was looked upon as being probably syphilitic in origin. This, however, could not be proved microscopically.

XI. Anomalies of Heart

Realizing that anomalies may or may not lead to death due to cardiac failure, we have included these under the general group of cardiac deaths. Two of the cases were in young children and two in adults. In reviewing the protocols, it appeared that the congenital lesion was actually an important factor in only one case.

(1) Patent ductus arteriosus.
Female. Age 3 years.
(2) Patent ductus arteriosus and foramen ovale.
Female. Age 3 days.
(3) Congenital stenosis of aortic valve.
Male. Age 50 years.
(4) Dextrocardia (Situs inversus viscerum).
Male. Age 32 years.

Cases Grouped According to Etiology
(Omitting myocardial degeneration (P.O.), coronary occlusion, aneurysms of heart, and heart, kidney, and arterial disease with failure.)

	Pneumo-coccic	Gono-coccic	Rheu-matic	Syphil-itic	Tbc.	Undeter-mined	Total No. of Cases	Per-centage
Pericarditis	....	....	....	....	2	3	5	8.19
Endocarditis	....	....	....	....	....	....	....	....
Acute endocarditis	2	2	3	....	....	2	9	14.7
Subacute endocarditis	....	....	3	....	....	3	6	9.83
Chronic and recurrent endocarditis	....	....	4	1	....	4	9	14.7
Chronic endocarditis	....	....	3	4	...	10	17	27.8
Pancarditis	....	....	....	....	....	....	....	....
Acute pancarditis	....	....	2	....	....	....	2	3.27
Chronic and recurrent pancarditis	....	....	5	....	....	....	5	8.19
Chronic pancarditis	....	....	1	....	....	....	1	1.63
Chronic Interstitial Myocarditis	....	....	1	....	....	2	3	4.91
Gumma of Heart	....	....	....	2	....	....	2	3.27
Miscellaneous	....	....	....	1	....	1	2	3.27
Number of etiological factors	2	2	22	8	2	25	61	....
Percentage of etiological factors	3.27	3.27	36.06	13.1	3.27	40.9	....	....

Sixty-one out of the 104 cases fall into this group, in which the etiology was on an infective basis. The percentages falling under the headings rheumatic and syphilitic are the outstanding features of the chart, and are in agreement with the usual findings in reports of this sort. The striking predominance of rheumatic fever as an etiologic factor is especially interesting. The percentage of cases labeled "undetermined" is unfortunately high.

Review of All Cases of Heart Deaths

	Number of Cases	Per Cent	Average Age
Pericarditis	5	4.79	49 years
Endocarditis	41	39.4	39 years
Pancarditis	8	7.69	26 years
Acute myocardial degeneration	8	7.69	42 years
Chronic interstitial myocarditis	3	2.89	36 years
Coronary occlusion	10	9.61	59 years
Aneurysms of heart	3	2.89	49 years
Gumma of heart	2	1.92	44 years
Heart, kidney, and arterial disease with failure	18	17.3	63 years
Anomalies	4	3.84	2 in children and 2 in adults
Miscellaneous	2	1.92	38 years

This chart summarizes the entire group from the standpoint of incidence of anatomical lesions and average ages. It is evident that the valvular lesions are the commonest, with heart, kidney, and arterial disease with cardiac failure next in frequency. The high incidence of coronary occlusion, which comes third in order, is of considerable interest. Three of the ten cases occurred in the first ten years and seven in the last seven years. This would appear to indicate that it is increasing in frequency, though such a statement would be hard to prove.

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How It Is Done

Hospital Library Service

It was on November 21, 1924 that the hospital library service was inaugurated at St. Agnes Hospital, Fond du Lac, Wis.,—the third city in Wisconsin to give free book service to general hospital patients.

Although the general impression at this time was that this service was a new venture in hospital administration, it is true that long before the war, as early as 1904 the McLean Memorial Hospital of Waverly, Mass., Massachusetts General Hospital of Boston, Mass., and the Iowa State Library Commission recognized the therapeutic value of organized hospital libraries with their carefully selected books and trained librarians.

However, the early hospital libraries existed with one or two exceptions in private mental hospitals, while today sanatoria for tubercular patients, specialized children's hospitals, municipal, and general hospitals are demanding and receiving free book service.

No doubt, the incentive for this work as well as its tremendous growth is due to the success of the American Library Association hospital service at home and abroad during the war—in the army, in the navy, and in the Public Health Department and the Veterans Bureau.

It was but a short time after the close of the war, and after the return of the doctors and nurses from abroad that attempts were made by these professional people, members of hospital staffs, to organize hospital library service in their own communities.

There are two systems used in this work—the unit system which is found generally in large city hospitals—endowed institutions—which means that the hospital furnishes all the books, buys the supplies, and equipment, and appoints a trained librarian who does nothing but library work for patients, nurses, and doctors.

And the second system is the group system under which the public library (or perhaps the board of control, or the state library commission) cooperates with the hospital authorities and supplies the books, truck, and librarian. This is the system used in medium-size cities or in hospitals without an endowment.

St. Agnes Service

Although the Sisters and nurses on the staff of St. Agnes Hospital felt the need of books for their patients long before 1924, it was with the organization of the St. Agnes Hospital Auxiliary, a group of true Christian women that the organization was made possible. They believed, as did the Sisters in charge, that the problem of the hospital today is to make the institution a place of happiness, insofar as happiness is compatible to loss of health—and books, they believed, would help to do this.

Miss Ella Korrer, the first president of the new club, appointed two members of the auxiliary to work with the librarian of the Fond du Lac public library—Miss Georgia Giddings and Mrs. T. Meagher. Later the following substitutes were selected—Miss Irene Solle, Mrs. Leo Korrer, and Mrs. Frank Yordy.

(Continued on Page 39a)

BOOK CART USED AT ST. JOSEPH'S HOSPITAL, FT. WAYNE, IND.